



**City of Los Angeles
Information Technology Agency**

**PROJECT
MANAGEMENT
METHODOLOGY**



**ITA Project Management Support Office
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CITY OF LOS ANGELES

PROJECT MANAGEMENT METHODOLOGY

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Purpose

This document provides an overview and description of the City of Los Angeles methodology for Information Technology (IT) project management.

The objective of the project management methodology is to provide a standard management approach and guidelines to ensure that IT projects are developed in a disciplined, well-managed, and consistent manner that promotes the delivery of quality products and results in projects that are completed on schedule and within budget.

Applicability of the Methodology

This project management methodology is generally applicable to the management of all IT projects in the City of Los Angeles. It provides guidelines for project management activities, responsibilities, and deliverables for IT projects. Application of the methodology should be scaled to the size and complexity of the project.

What is a Project?

A project is a temporary endeavor undertaken to create a unique product or service.

Source: PMI

A project is a temporary process because once the end goal is achieved, the project is completed. For this reason, the objective or end point of a project must be defined at the beginning of the project to ensure successful completion. The reason some projects never end is because no one defined ***what constitutes completion!***

What is an IT Project?

An IT project is any project that includes development or implementation of computing hardware, software, data, and video or voice communications.

What is Project Management?

Project Management is the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations.

Source: PMI

In order to meet stakeholder needs and expectations, projects require a clear definition of the business problem or opportunity with well-defined goals and success criteria. The basic question in order to define the success criteria is “why are we doing this project”? Criteria for project success must be expressed in terms of business, political or social value and must be measurable.

There are three aspects to project success:

1. Does the implemented system/product meet the defined business goals and objectives such as cost reductions, increased revenues, provide better service to the public, improve public safety, improve productivity, etc...?
2. Does the project meet the documented requirement specifications?
3. Was it completed on time and within the approved budget?

Of these three aspects the first, meeting the project goals, is the most important. This methodology focuses on the second and third aspects, getting the project completed according to specifications, schedule and budget, which are the means for achieving the project objectives. Often it is not possible to achieve all three of the above objectives and management compromises must be made.

Project Processes

There are two kinds of project processes:

- *Product-oriented processes* are concerned with specifying and creating the final product. A methodology for product-oriented processes describes how to develop and implement IT products, e.g. how to do requirements specifications, how to design a network, and how to develop an acceptance test plan. This is outside the scope of this document.
- *Project management processes* are concerned with describing and organizing the work of the project. The methodology described in this document is built around five standard project management processes (initiation, planning, execution, controlling, and closing) that are independent of the product being developed and the product development and implementation methodology.

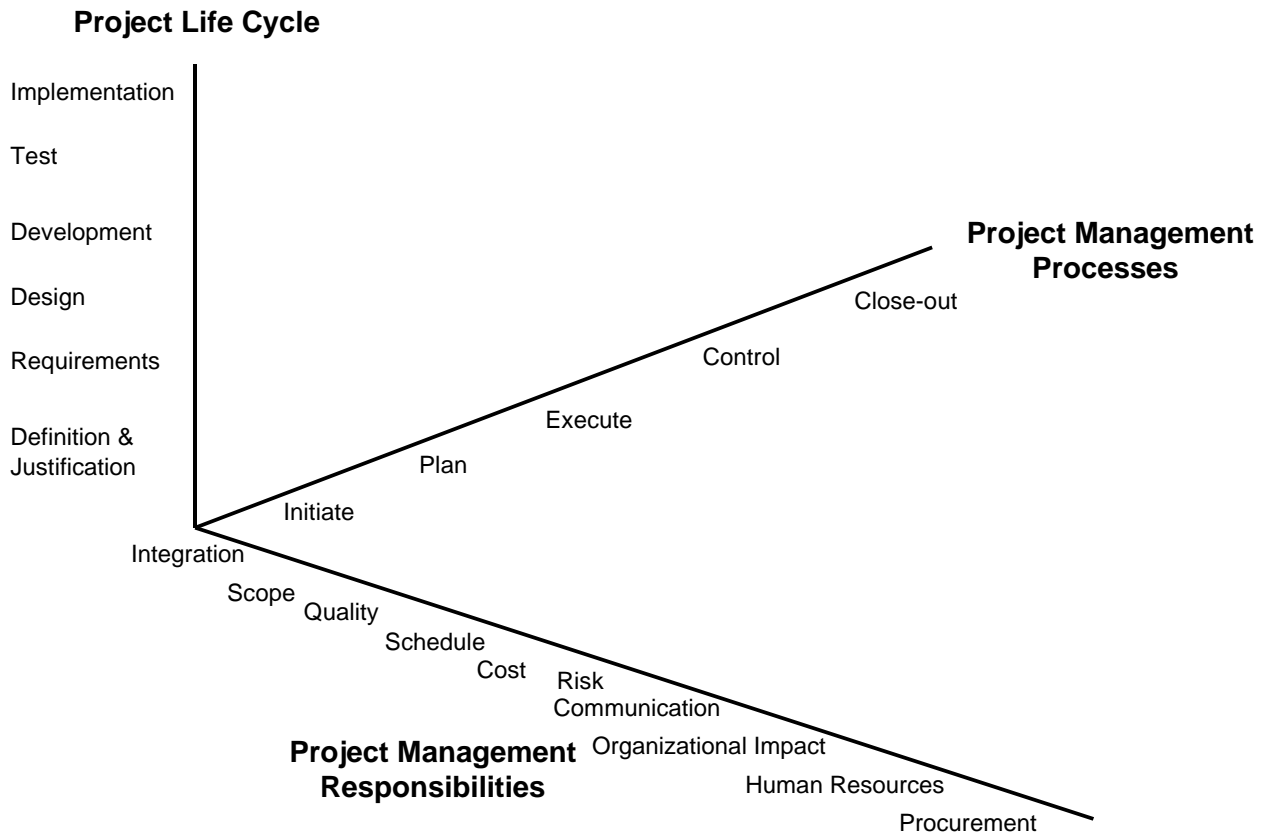
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Information Technology Project Management Overview

Initial Release	1.0
Date:	02/24/1999

The Three Dimensions of Project Management

Management of a project can be viewed in three dimensions as shown in the Figure 1-1 below. The Project Life Cycle axis describes the work to be done to deliver the product. The Project Management Processes axis delineates five project management processes that must be performed for every project and every phase thereof. The Project Management Responsibilities axis lists ten areas of responsibility that must be addressed by the project managers during each of the five project management processes for all projects. The three dimensions are discussed in more detail below.



The Three Dimensions of Project Management
Figure 1-1

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Information Technology Project Management Overview

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The Project Life Cycle

IT projects are usually divided into several phases that make up the project life cycle. A typical IT project includes separate phases for project definition and justification, requirements analysis, design, development, test, and implementation as shown on the vertical axis of Figure 1-1. Each phase of the project life cycle has specific deliverables, one of which is the proposed plan for the next phase. In the City of Los Angeles, funding is usually allocated for multiple phases. When new funding is required, the proposed plan for the next and subsequent phases becomes a key part of the funding request.

Project Management Processes

The five project management processes depicted in Figure 1-2 are not discrete or one-time events. They are overlapping activities which occur at varying levels of intensity throughout each phase of the project.

Project Management is an Iterative Process

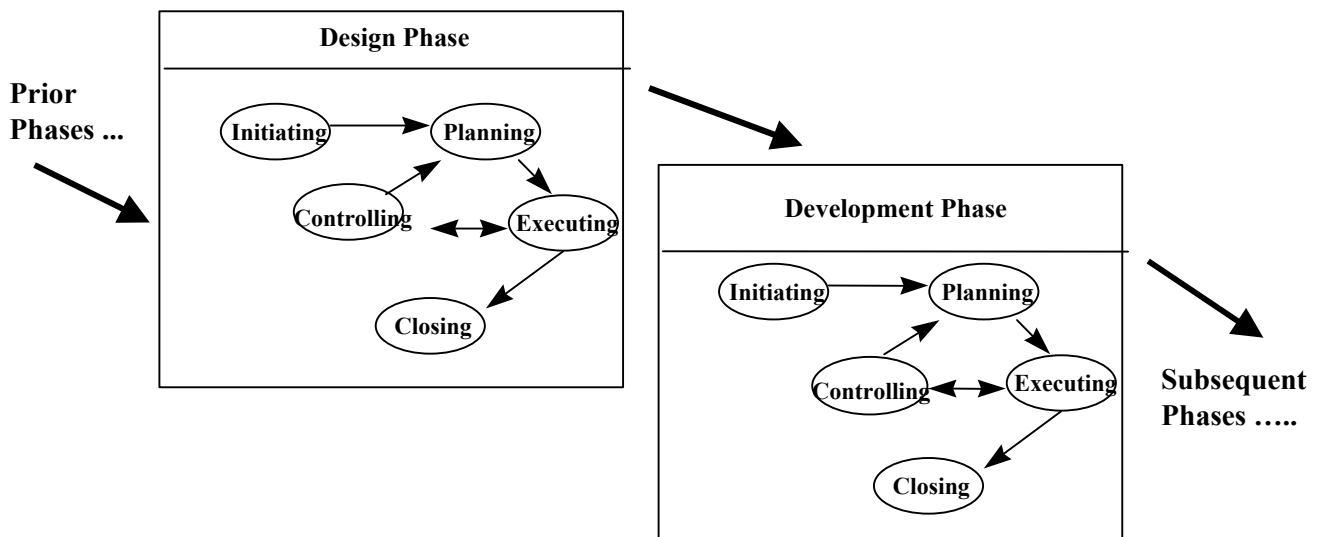


Figure 1-2

As the Figure 1-2 shows, initiation and closure are performed only once per project phase, but planning, execution and control are iterative processes that are performed continuously throughout the life of each project phase.

The five project management processes are defined briefly below. This methodology is structured around these processes and the required deliverables from each process.

1. **Initiating:** Defining a project and organizing to start a project or a phase within a project. You may ask how you can initiate a project without planning? The project definition and justification phase of a project is by definition started without a detailed plan. However, follow-on phases are initiated based on the plan developed as a deliverable of the previous phase.
2. **Planning:** Developing and maintaining a workable plan to accomplish the project or project phase. This process defines what needs to be done, when, by whom, and all resource requirements. Planning is a continuous process that interacts with project initiation, execution, and control. Planning is done at various levels of detail depending on where the project is in its life cycle and the intended use of the plan. For example, a funding request for the City Council will contain a high-level work plan whereas a much more detailed work plan is required for day-to-day management of the project.
3. **Executing:** Coordinating and authorizing people or other resources to carry out the plan.
4. **Controlling:** Ensuring the project objectives are met by monitoring and measuring progress against the plan and taking corrective action when needed. The sooner problems or variances from the plan are detected the easier it is to take corrective action. Therefore, it is better to provide early warning of potential problems than to wait until the problems have grown to the point that corrective action is difficult or even impossible. Open, honest and early communications between project team members, project manager, and the stakeholders are the key ingredients of all successful projects.
5. **Closing:** Formalizing the acceptance of the project or project phase and documenting lessons learned.

Project Management Responsibilities

The ten Project Management Responsibilities listed in Figure 1.1 are defined briefly below.

1. **Project Integration Management:** Ensures that all the elements of the project such as hardware, software, network, etc., and those listed below are coordinated properly.
2. **Project Scope Management:** Includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Project Scope Management consists of scope planning, scope definition, scope verification, and scope change control.
3. **Project Quality Management:** Ensures that the project will satisfy the agreed-upon requirements. It includes quality planning, quality assurance and quality control.
4. **Project Schedule Management:** Ensures timely completion of the project. It consists of task or activity definition, activity sequencing, resource planning, activity duration estimating, and project schedule development and control.
5. **Project Cost Management:** Ensures that the project is completed within the approved budget. It consists of resource estimating, cost estimating, and cost monitoring and control.
6. **Project Risk Management:** Identifying, assessing, and mitigating project risks associated with factors such as new technology, very tight schedule constraints, lack of availability of skilled resources, and readiness of the user organization to accept the change.
7. **Project Communication Management:** Provides timely and appropriate generation and dissemination of project information to management and other stakeholders to ensure that their expectations are consistent with the realities of the project.
8. **Organizational Impact Management:** Identifies organizational changes that must occur and develops appropriate communication and training programs for impacted departments and staff to support the new system.
9. **Project Human Resource Management:** Provides effective leadership and management of the project team. It includes project organizational planning, staff acquisition, and team development. Personal development and growth are key motivators for City staff. Therefore, fostering personal development and growth are important parts of Project Human Resource Management.

Continual Improvements

10. **Project Procurement Management:** Includes all the processes required to acquire goods and services from outside the performing organization. This consists of procurement planning, RFP preparation, source selection, and contract negotiation and administration. It is important to understand the City procurement process and obtain expert support on purchasing critical items for the project to minimize significant project delays.

It is important that City departments provide continual input on ways to improve project management.

The Information Technology Agency (ITA) is responsible for identifying and establishing project management training programs and policies as well as for providing a practical project management methodology with input and review by a multi-department Project Management Steering Committee where needed. ITA also assists City departments in the effective utilization of the methodology.

City Department Managers and their project staffs have the following responsibilities:

1. To ensure that project management policies are implemented within their organizations.
2. To apply the methodology to their projects in a cost-effective manner which is consistent with the size and complexity of the project.
3. To provide feedback to the ITA Project Management Support Office for improvement of the policies and the methodology.

ITA has established a multi-department Project Management Steering Committee to help develop the initial version of these policies and the methodology. ITA will continue to use this Steering Committee to review policies, methodologies, and guidelines to continually improve the City's project management process.

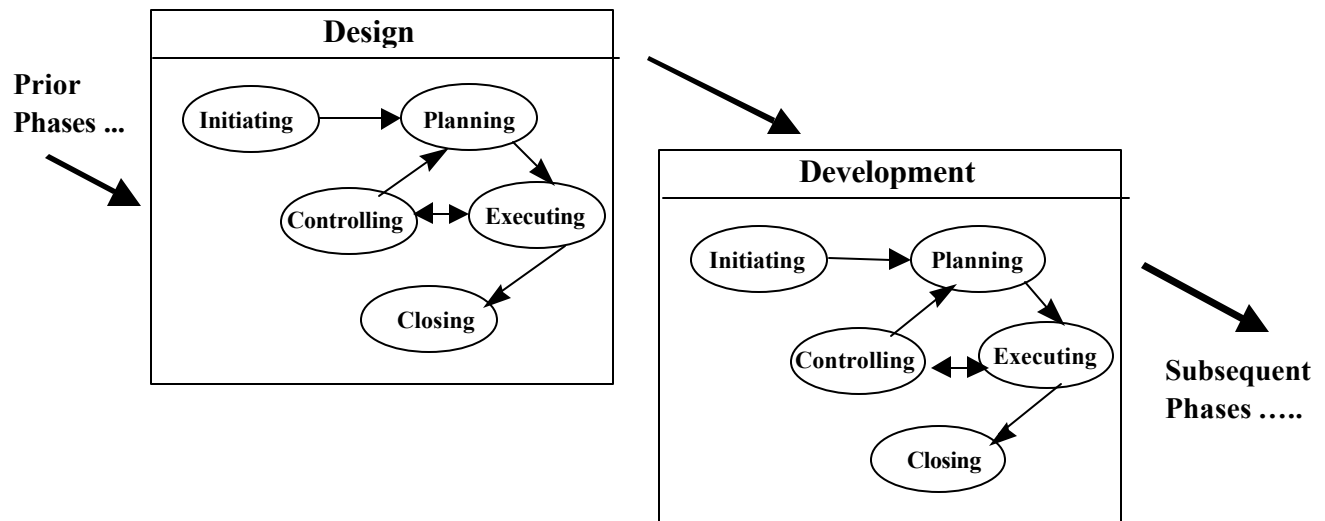
Conclusion

The rest of this methodology defines the deliverables to be produced in each of the five project management processes. These deliverables are required for the overall project and for each phase within a project. However, the level of detail varies by phase. The methodology also addresses all the management responsibilities described before.

IT Project Initiation

Purpose

The purpose of the project initiation process is to authorize and formalize the existence of a new project or the start of a new phase of an existing project.



Project Management Process Overview
Figure 2-1

Project Initiation Overview

It is important to understand the relationship between project initiation and project planning. The above figure shows that project initiation is the first step in every project or project phase, and that each phase has an initiation step and a planning step. However, a project phase cannot be authorized and initiated without some pre-planning. With one exception, the pre-planning necessary for initiating a project phase is one of the deliverables of the previous phase. If new funding is required for the current phase, the funding request will contain the plan that was developed as a deliverable of the previous phase.

The exception is the initial project definition and justification phase. This is usually initiated by a manager based on the stimulus of an important business need or opportunity or a legal requirement with little or no preplanning. Because it is performed using existing staff and funding resources it can be authorized by the responsible manager without any formal proposal or funding request.

IT Project Initiation

Project Initiation Inputs and Deliverables

The inputs to the Project Initiation process are:

- The project plan and funding request, if necessary, that were prepared in the previous project phase
- The Council motions that document appropriation of the funds and approval of any additional required positions and other resources.

The outputs of the Project Initiation phase are:

- The Project Charter
- Assigned staff
- Space, furniture and equipment for the project team

Project Charter

The Project Charter defines the formal commitments of all organizations involved in a project and describes how the project will be managed. The charter is a living document that is updated for each phase of a project in both the initiation and planning processes. The key elements of a project charter are:

1. A one-page Project Statement that describes the project and project phases.
2. A description of major project deliverables including the final product(s) and the hardware, software, and documentation required to produce the final product(s). The documentation should be descriptive at a high level, not detailed listings of each piece of hardware and software.
3. Completion criteria for the project and the current project phase (listing of deliverables and approvals that will constitute completion).
4. Key project assumptions and constraints related to staffing availability, technology availability, and time required for resolution of project issues, such as proposed business process changes which are certain to arise.
5. Project organization which identifies responsibilities of all participants, the project manager, the executive sponsor, the steering committee, the users, ITA, outside consultants and suppliers of hardware, software or services, etc...
6. A description of the basic strategies for:
 - Scope Management
 - Quality Management
 - Schedule and cost planning and reporting
 - Communicating with stakeholders
 - Procurement (what kinds of equipment and services will be procured) and the acquisition process

IT Project Initiation

Project Initiation Activities

- Human Resource Management including definitions of reporting relationships, performance appraisal, and team training

At this stage the Charter describes only basic policies and strategies for the above subjects. However, the Charter is a living document that is updated as more information is generated in the Planning process.

There are six important project initiation activities that are performed concurrently:

- Identify all project stakeholders and their goals or interests (see more discussion below). Stakeholders are individuals who have a vested interest in the project because they will be impacted directly by the project, must participate in it, or will be affected significantly by the project results. Consensus must exist and be **maintained** throughout the project among all the stakeholders not only on the scope and deliverables of the project, but also on the roles and responsibilities of all of the parties.
- Communicate with stakeholders to firm up their commitments as described in the Project Charter, for example, identifying who will be assigned to work on the project.
- Acquire/set up space, equipment, and facilities for the project team.
- Organize the assignment/recruitment/transfer of employees and/or contractors to the project team.
- Conduct project/phase kickoff meeting.
- Conduct initial team orientation/training. Although most training will take place after Initiation, some basic orientation and training may be necessary in this phase.

The above activities need to be repeated at the beginning of each project phase to ensure that the project objective is still valid and achievable, to define the deliverables of the next phase, and to identify and document any changes in the project which impacts the stakeholders or their interests.

IT Project Initiation

Stakeholders

Project Stakeholders are individuals and organizations who are actively involved in the project, or whose interests may be positively or negatively affected as a result of project execution or successful project completion.

Source: PMI

To ensure project success, the project management team needs to identify stakeholders early in the project, determine their needs and expectations, and manage and influence those expectations over the course of the project.

Stakeholders on every project include, but may not be limited to:

- The executive sponsors who are the champion for the project. They also take the lead in obtaining recognition for the need for the project and ensure adequate priority and resources are made available. The executive sponsors also provide strategic direction, ensure timely decision-making, and help to overcome organizational conflicts and barriers to project success.
- The Mayor and City Council who approve funding for the project.
- Department Managers and elected officials who may be impacted by the results of the project.
- The users who are the individuals or organizations that will use the product or service.
- The customers who are the managers of the users and approve the requirements and the final product.
- Any organizations that are involved in the review, approval, or any other administrative process, including, but not limited to, the City Administrative Officer (CAO), the Office of Chief Legislative Analyst (CLA), and General Services Department (GSD).
- The project manager who is responsible for leading the project team to achieve the project objectives and who must communicate effectively with management and all stakeholders to ensure that expectations are consistent with project realities.
- The project team members who are responsible for performing the work on the project.
- The City's Information Technology Agency, which has the objective of making all IT projects successful.

IT Project Initiation

Stakeholders are critical to the timely completion and success of the project and need to be brought on board as early as possible in order to obtain their support and commitment to the plan and schedule. In particular, the staff of the CAO and the CLA can better facilitate approval of a budget proposal if they have been involved from the beginning.

Good communication between the project manager and the stakeholders throughout the life of the project is critical to project success. Since stakeholders may have conflicting interests that must be balanced, good communication is essential to ensure that stakeholders understand why tradeoffs are made between conflicting interests, and that their expectations match the realities of the project.

Project Planning Overview

What is Project Planning?

Planning is the Seed for Success

Without a project plan, project success will be impossible

Project planning is a process concerned with organizing the efforts to implement a project and to meet all project objectives for functionality, quality, reliability, schedule and cost. The purpose of the plan is to provide a framework for management monitoring and control of performance. The project plan serves five functions:

1. It defines the scope of the project, consisting of the end products that will be delivered (a.k.a. deliverables), the customers or users of the end product, and all the associated assumptions and constraints.
2. It identifies the project activities that will be performed.
3. It describes the interdependencies between the activities and when the activities will be accomplished.
4. It defines the resources necessary to acquire/develop and implement the end products.
5. It describes the processes and procedures that will be used for managing schedule, cost, quality, procurement and risk.

The project plan is more than just an estimate of what will be done, when it will be done and the resources required to do it. It is a commitment by individuals and organizations to perform according to the plan. Therefore, it is critical that the individuals who must make these commitments are active participants in the planning process and accept ownership of their portion of the project plan.

Project planning is a continuous process, as plans need to be updated continually to reflect project performance and changes in external factors. However, at the beginning of each project and each project phase, baseline plans must be documented against which performance will initially be measured. Measuring performance against the baseline is necessary to determine corrective actions needed to stay on plan or to identify any changes required to the plan. The focus should always be on having a current plan that charts the road to successful achievement of the project objectives. If the plan is not updated continually, it will quickly deviate from project reality, and will no longer be useful as a guide to the project team or as a vehicle to communicate with project stakeholders.

Project Planning Overview

Project Planning Activities

The project planning activities and their inter-relationships are shown in **Figure 3-1**. The activities are divided into **core processes** that include the activities required to build or implement the product or service, and **facilitating processes** that help to ensure that the product will meet the goals of the project and that the project will be managed successfully.

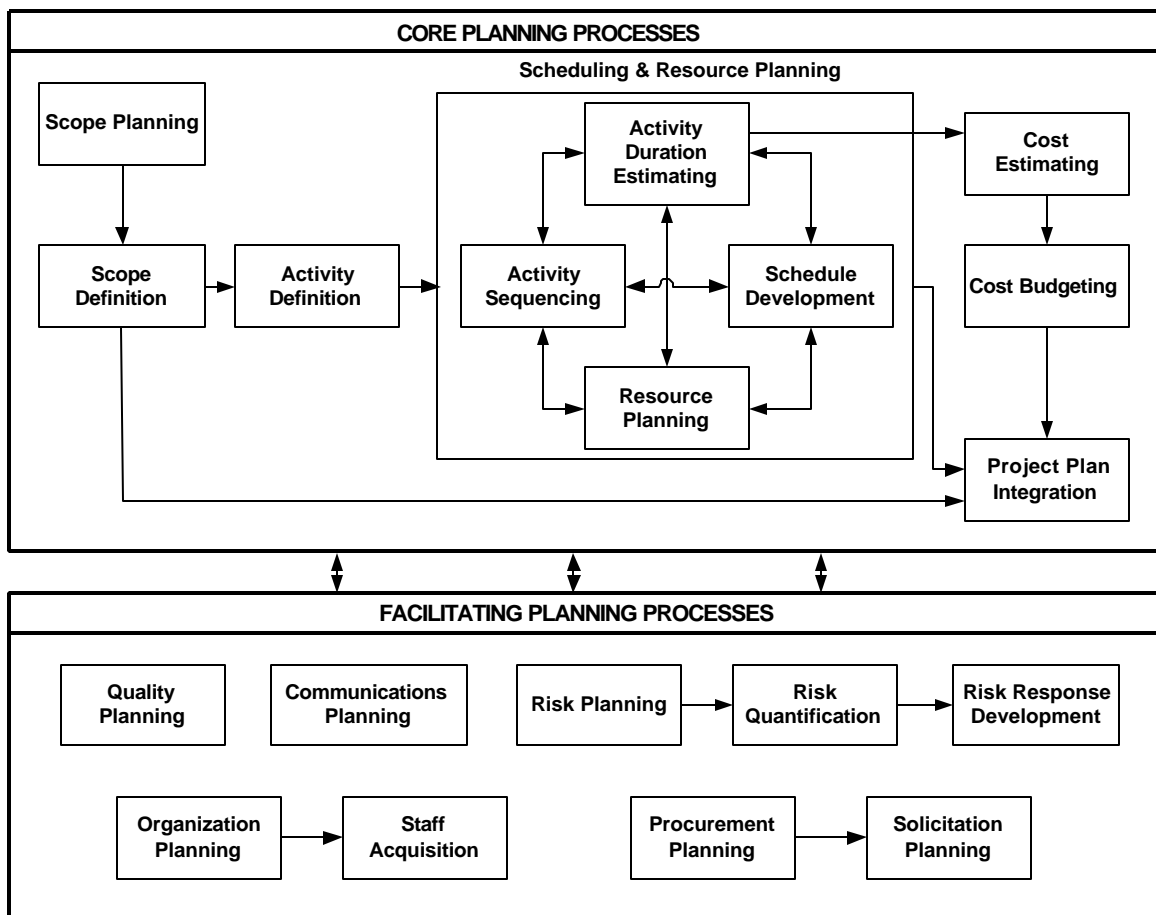


Figure 3-1

Source: PMI

Project Planning Overview

Core Planning Processes

The core planning processes are shown in Figure 3-1 as a logical sequence of events. In reality, there are many inter-dependencies among the steps and the process is highly iterative. Planning is also done in layers, similar to peeling an onion. It starts at a high level based on a general definition of a project and previous experience on similar projects and evolves into very detailed task statements, schedules and cost estimates. A brief description of each step is provided below.

- **Scope Planning:** Scope describes what is included in the project or project phase, and equally important, what is excluded. Scope includes functional scope, organizational scope (e.g. which organizations will be included), geographical scope (e.g. which sites are included), and all important assumptions and constraints. Scope can be viewed from two perspectives: Product scope as viewed by the user that defines the features, functions and limitations of the product or service, and project scope as viewed by the implementers that defines the work to be done to develop/implement the product or service.

The output of Scope Planning is a written Statement of Scope as the foundation for project planning and project decisions. The Scope Statement includes a list and brief description of all deliverables of the project and/or the current phase. Project deliverables are features and functions that require review and approval by the stakeholders. All critical assumptions and constraints that affect the project scope should be documented. It is very important to identify the project boundaries clearly up front and to communicate them to the stakeholders. It is equally important to identify project exclusions such as functions that will not be automated or customers that will not be served, and to identify all the details of what is included in the project scope.

- **Scope Definition:** Subdividing the major project deliverables into smaller, more manageable components. Examples might be subsystems or functional modules of a software package, or a breakdown of a large systems integration task into hardware, network and software components, etc. The outputs of scope definition are a description of each of the component deliverables and the top levels of a work breakdown structure (WBS) defining their relationships.

Project Planning Overview

- **Activity Definition:** Identifying the specific tasks that must be performed to produce the various project deliverables. The format for documenting this activity is the WBS that identifies the tasks and their inter-relationships together with a task statement that describes each task, its inputs and its deliverables.

The next four items are closely inter-related. Activity Sequencing, Resource Planning, Activity Duration Estimate and Schedule Development are performed iteratively until a satisfactory project schedule is developed.

- **Activity Sequencing:** Defining the logical dependency relations between tasks. Logical dependency relations are to be distinguished from resource driven dependencies that are handled in Schedule Development.
- **Resource Planning:** Determining the availability of resources (people and equipment) that will be used in developing the project schedule. Resource planning may need to be repeated if the scheduling process yields unsatisfactory results.
- **Activity Duration Estimating:** Estimate the resources and duration required to perform each task considering the skills and experience of the available staff. Activity duration estimation should also take into consideration the project organizational structure and the time required for decision-making and decision approval.
- **Schedule Development:** Balancing activity sequences, activity resource requirements and resource availability to create a project schedule. Important factors in this process are the identification of the critical path, that is the sequence of tasks that if slipped will cause the overall project to slip, and an assessment of uncertainty and risk to the project.
- **Cost Estimating:** Estimating the costs of resources (people, equipment, and materials) by activity, and associated overhead costs.
- **Cost Budgeting:** Summarizing the cost estimates into time-phased budget forecasts by organization and funding source.
- **Project Plan Development:** Taking the results of all of the above planning processes and putting them in a consistent, coherent document. The document may be a higher level plan that includes a funding request or a very detailed plan used by the Project Manager for tracking progress on a day-to-day basis.

Project Planning Overview

Facilitating Planning Processes

The facilitating planning processes are activities that support the implementation of a quality product on schedule and within budget. They are activities that require resources and schedules just as the core processes. Facilitating processes should be included on the project WBS.

- **Quality planning:** Defining resource requirements and schedules for quality reviews, whether technical reviews or user reviews. It is important to plan these reviews because they usually require commitments of expert resources from outside the project team. Another aspect of quality planning is to plan quality assurance audit activities, whether done internally or by an external independent auditor.
- **Organization planning:** Identifying, documenting and assigning project roles, responsibilities and reporting relationships. Major projects require a fulltime project team reporting to the project manager plus part-time support from user departments and various ITA Bureaus, if required. It is important that responsibilities be delegated in an effective manner and understood by all parties. This process should also identify the necessary working groups that will provide input and include a review by stakeholders.
- **Staff Acquisition Planning:** Hiring or transferring staff onto a project can be a significant bottleneck. Therefore, it is essential to document the staff acquisition process into the project schedule, and that appropriate management commitment is obtained up front. There must be a mutual understanding on how and who will conduct project team performance evaluations.
- **Communications Planning:** Determining the information and communications needs of the stakeholders: who needs what information, when and how it will be provided to them. Communications can consist of presentations scheduled at essential points in the project, newsletters, or other forms of communication. All of these require resources that must be included in the project plan.
- **Risk Planning:** Consists of risk identification, risk quantification and risk response planning. Some typical factors increasing the risk of a project are:
 - Utilization of new state-of-the-art technologies
 - Lack of staff skills and experience in the technologies that will be utilized
 - Very aggressive schedules due either to mandatory external requirements or management goals
 - Lack of buy-in by the stakeholders
 - Organizational unwillingness or unreadiness to make the necessary business process changes

Project Planning Overview

Planning Overview Conclusion

- Inadequate management of project scope that allows uncontrolled scope expansion
- **Procurement Planning including Solicitation Planning:** This is another potential project bottleneck. Therefore, it is essential to lay out the schedule for the complete procurement process from the development of any request for proposals (RFP) to final approvals and product or service delivery.

Thorough planning is critical to the success of a project. Good planning will help avoid costly overruns and ensure that the stakeholders' objectives are achieved. Planning lays a foundation for improved communication with the stakeholders so that their expectations are consistent with the realities of the project. The result of the planning process is an integrated project plan document that is the baseline for schedule, cost, quality, and risk management. The amount of planning performed should be commensurate with the scope of the project and the value of the information developed.

Scope Planning

RELATIONSHIPS AMONG THE PLANNING PROCESSES

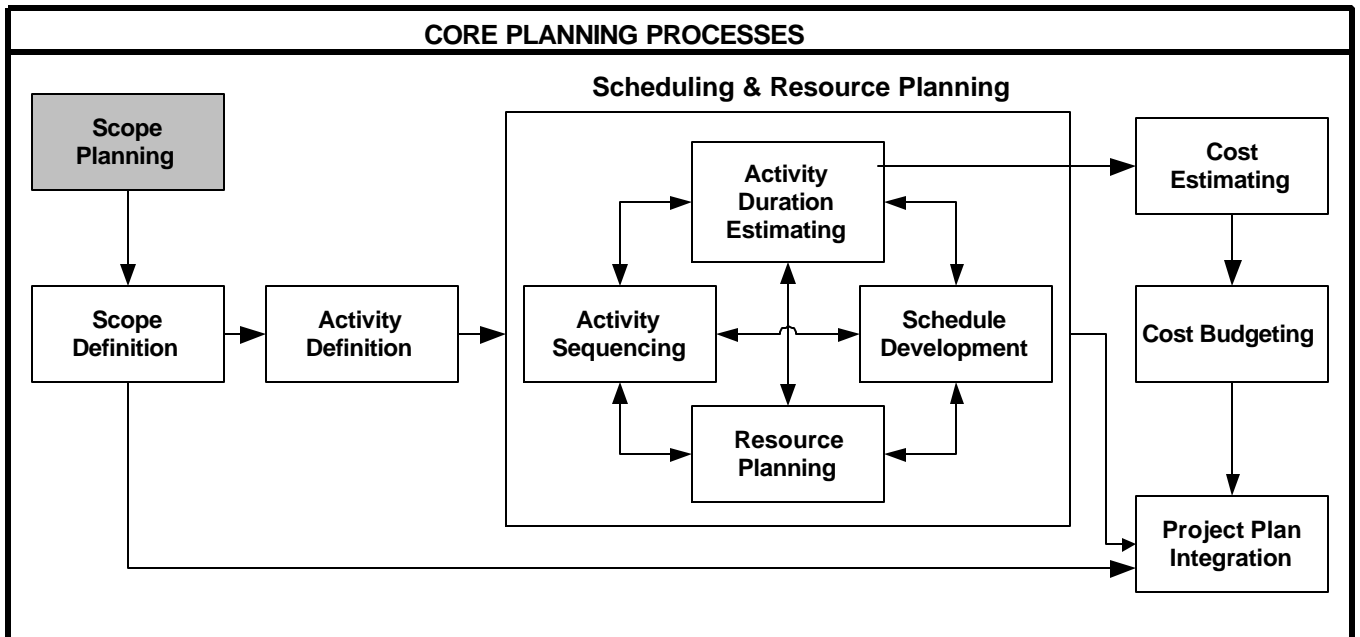


Figure 4.1

Overview

Scope planning is the process of developing a written scope statement as the basis for future project decisions including, in particular, the criteria used to determine if the project or phase has been completed successfully.

Source: PMI

Scope planning is the first step in the core planning processes shown in Figure 4.1 above.

Scope Planning looks at scope from the viewpoint of the user. It describes what will be delivered to the users, where it will be delivered, and how it will be delivered. In this context, scope includes functional scope, organizational scope (e.g. which organizations are included), geographical scope (e.g. which sites are included), and all key assumptions and constraints. Scope describes what is included in the project or project phase, and equally important, what will be excluded, such as functions that will not be automated or customers that will not be served. Scope

Scope Planning

Scope Statement

Planning includes the identification of alternative approaches to achieve the project objectives, and the cost/benefit analysis of the alternatives.

The outputs of Scope Planning are the Scope Statement with supporting details and the Scope Management Plan.

The Scope Statement defines the project objectives, scope, deliverables, assumptions, constraints, and business justification. The Scope Statement should focus on what will be delivered to the users and be written in “user language” rather than “technical language”. The Scope Statement includes not only the statement of “what is the scope”, but also the business rationale behind it. Sometimes the best way to communicate scope is to describe what is excluded rather than what is included. This is very useful in the management of stakeholder expectations. The Scope Statement is a very important part of a project funding request.

The Scope Statement should include:

1. **Project description:** A brief description of the project, the business need for it and its importance and priority.
2. **Phase description:** A summary of the next phase(s) that is (are) the subject of this planning activity. The plan being developed may be for a single project phase, such as requirements analysis, or may be for multiple phases, such as design, development and implementation combined. The latter case is most common when a vendor is contracted to design, develop and implement a system. However, when a multi-phase contract is given to a vendor, it is still important to have checkpoints at the end of each phase and to review and update the Scope Statement if necessary.
3. **Project deliverables:** A description of major project deliverables including the final product(s) and the hardware, software and documentation required to produce the final product(s). Project deliverables are those items that must be delivered to complete the project or project phase, and must be formally accepted by the key stakeholders. The deliverables may include things such as requirements and design documents, hardware and software installations, test plans, training plans, and user and technical support manuals. For each deliverable there should be:
 - A description of the deliverable (high level, not detailed listings of hardware and software)
 - The approach to be used to develop/acquire the deliverable
 - Completion and acceptance criteria

Scope Planning

- Lead/responsible organization (user organization, systems organization, vendor, etc.)
- 4. **Project objectives:** Project objectives are the quantifiable criteria that must be met for the project/project phase to be considered successful. Project objectives include cost, schedule, and quality measures.
- 5. **The business justification for the project** in the form of a summary of the cost/benefits analysis.
- 6. **Project assumptions and constraints:** Key project assumptions and constraints related to staffing availability, technology availability, and time required for resolution of project issues that are bound to come up. Assumptions may relate to issues such as: readiness of the organization to accept and implement changes to their business processes; the availability of key resources whether staff, space or equipment; the ability to freeze an existing system while the replacement system is being developed; or the performance and reliability of a new technology being used. Constraints may be financial, legal, deadline, technical or political.
- 7. **A description of functional scope** in the form of high level business process flow charts supported by process descriptions, showing clearly the boundaries of business processes/functions that are included and those that are excluded from the scope of the project.
- 8. **A description of the organization/user scope** showing organizations/users that will be affected and how. The potential impact of the project on job classifications, training requirements and labor relations should be addressed. Here again, definition of exclusions is very important.
- 9. **A description of the geographical scope** and sites that will or will not be supported, or will be supported in different ways.
- 10. **A description of the technical scope**, that is, the technologies that will be utilized, and those deliberately excluded, and why.
- 11. **A description of the potential risk factors for the project** such as, use of leading edge technologies, lack of required skills, lukewarm management support, etc., and a qualitative assessment of the potential impact on project success in terms of quality, schedule and cost.

Scope Planning

Validate the Scope Statement

Once the Scope Statement has been developed, the next step for the project team is to review it with the project sponsor and stakeholders for their approval.

This is the time to ensure there are no misunderstandings between the team and the stakeholders that could result in changes to the project scope after the work has begun.

Validating the project Scope Statement requires the project manager and the project team to perform the following tasks:

1. Prepare a brief presentation for the project stakeholders;
2. Present the project Scope Statement and obtain feedback;
3. Make necessary changes and obtain sign-off from the project sponsor and stakeholders.

Scope Management Plan

Management of project scope is one of the critical success factors in project management. The Scope Management Plan ensures that uncontrolled “scope creep” will be avoided. Scope is developed in layers. Scope Planning addresses the description of deliverables and how they will be produced. Scope Definition, chapter 5, starts to define the work to be done from the top down in the form of a Work Breakdown Structure. Activity Definition, chapter 6, breaks the work down further into detailed tasks or work packages. All of these three processes define project scope, both the scope of the deliverable product and the scope of the necessary work to develop/implement the product.

The Scope Management Plan describes the organization and procedures to be used for scope verification and change control. The key elements of Scope Management are:

- A good and complete definition of project scope at each layer, i.e. Scope Planning, Scope Definition and Activity Definition. Precision in the definition of scope is critical or control of scope creep is impossible.
- A scope verification process to monitor the project scope. Scope verification involves inspection and formal approval of project deliverables such as design documents to ensure they are consistent with the approved project scope, and monitoring of the project plan to watch for the addition of out-of-scope activities.
- A change control process and approval procedure for any significant changes in the project scope that may affect quality, schedule or cost.

Scope Definition

RELATIONSHIPS AMONG THE PLANNING PROCESSES

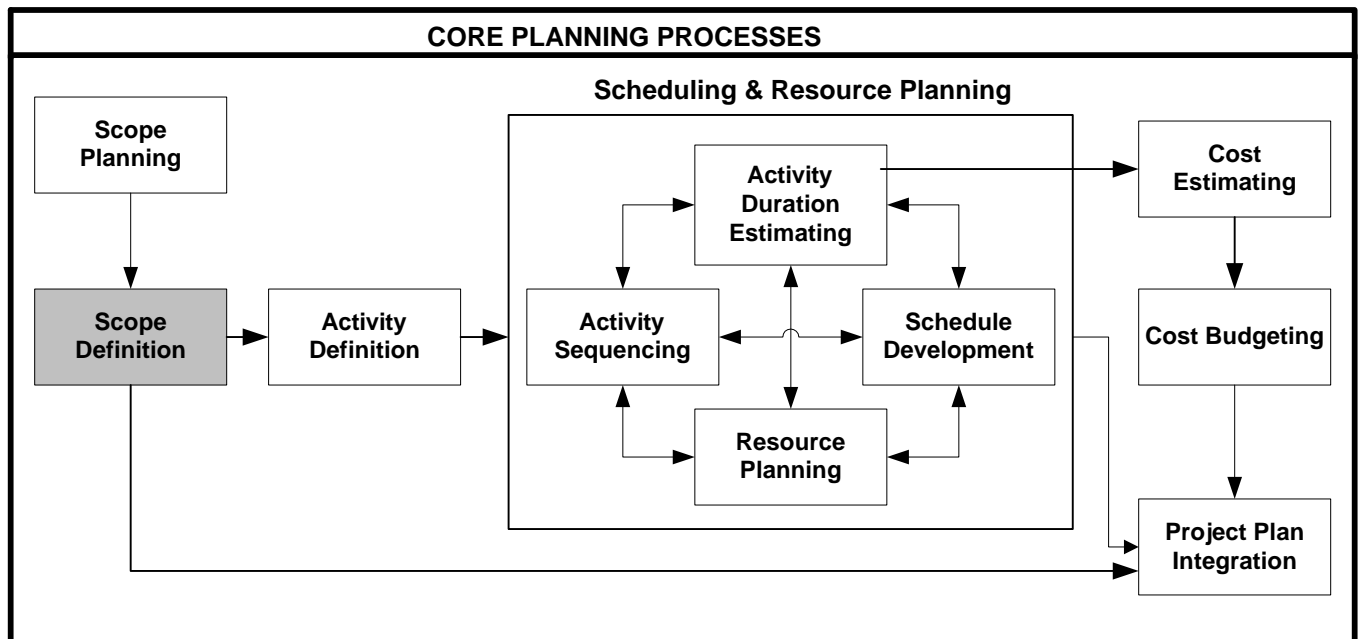


FIGURE 5-1

SCOPE DEFINITION

Scope definition involves identifying the major tasks required to produce the project deliverables and meet the objectives defined in the project budget proposal and the project charter, and the in-process or intermediate deliverables associated with these tasks. For example, whereas the final project deliverable may be an implemented system with hardware, software, and user documentation, there is a whole set of in-process deliverables that must be prepared and approved appropriately. Some examples are:

- Requirements document
- Installation hardware and software for the development team
- System design document
- Program specifications
- Work plan
- Test plans

A clear definition of these deliverables and the tasks required to produce them is very important in order to:

- Define a baseline for performance measurement and control
- Facilitate clear assignment of responsibilities
- Reduce project risks by communicating clearly both the work to be done and the deliverables to be produced

Scope Definition

Project tasks must be defined to develop, build, and install the product or system and to perform the associated project management activities.

There are two outputs of scope definition:

- The Work Breakdown Structure (WBS)
- The Task Definition Statements

THE HIGH-LEVEL (SCOPE LEVEL) WORK BREAKDOWN STRUCTURE

The **Work Breakdown Structure (WBS)** decomposes the entire project into a logical structure of tasks and activities that are tied to deliverables and to assigned responsibilities. The WBS developed in Scope Definition is decomposed only three or four levels to produce the deliverables discussed above. The WBS is developed in more detail in the Activity Definition Process to create work packages that have 1-3 week duration.

WBS work packages are developed by answering the question: “What tasks need to be done to produce the project deliverables?”. The degree of detail and the organization of the WBS structure are subjective and reflect the preferences and judgment of the project manager. The WBS will reflect the way that the project manager will plan, delegate responsibility, and manage and control the project. In Scope Definition, the first 3 or 4 layers of the WBS should provide enough detail to show responsibility for all major deliverables.

EXAMPLES OF HIGH-LEVEL WORK BREAKDOWN STRUCTURES

There are two dimensions to the breakdown of the work: A product breakdown and a functional breakdown. The characteristics of the WBS depend upon the nature of the project and how the project manager wants to plan and manage the work. For example, if a project is broken into several implementation phases, it may be best to produce a product WBS. Otherwise, a functional WBS can be developed to depict the associated project deliverables.

IT Project Planning

Scope Definition

The example in Figure 5-2 is a software package implementation project where the project has been broken into major phases representing implementation of different modules of the software package. Thus, the first layer of the WBS is a product breakdown, followed in the next layer by a functional decomposition.

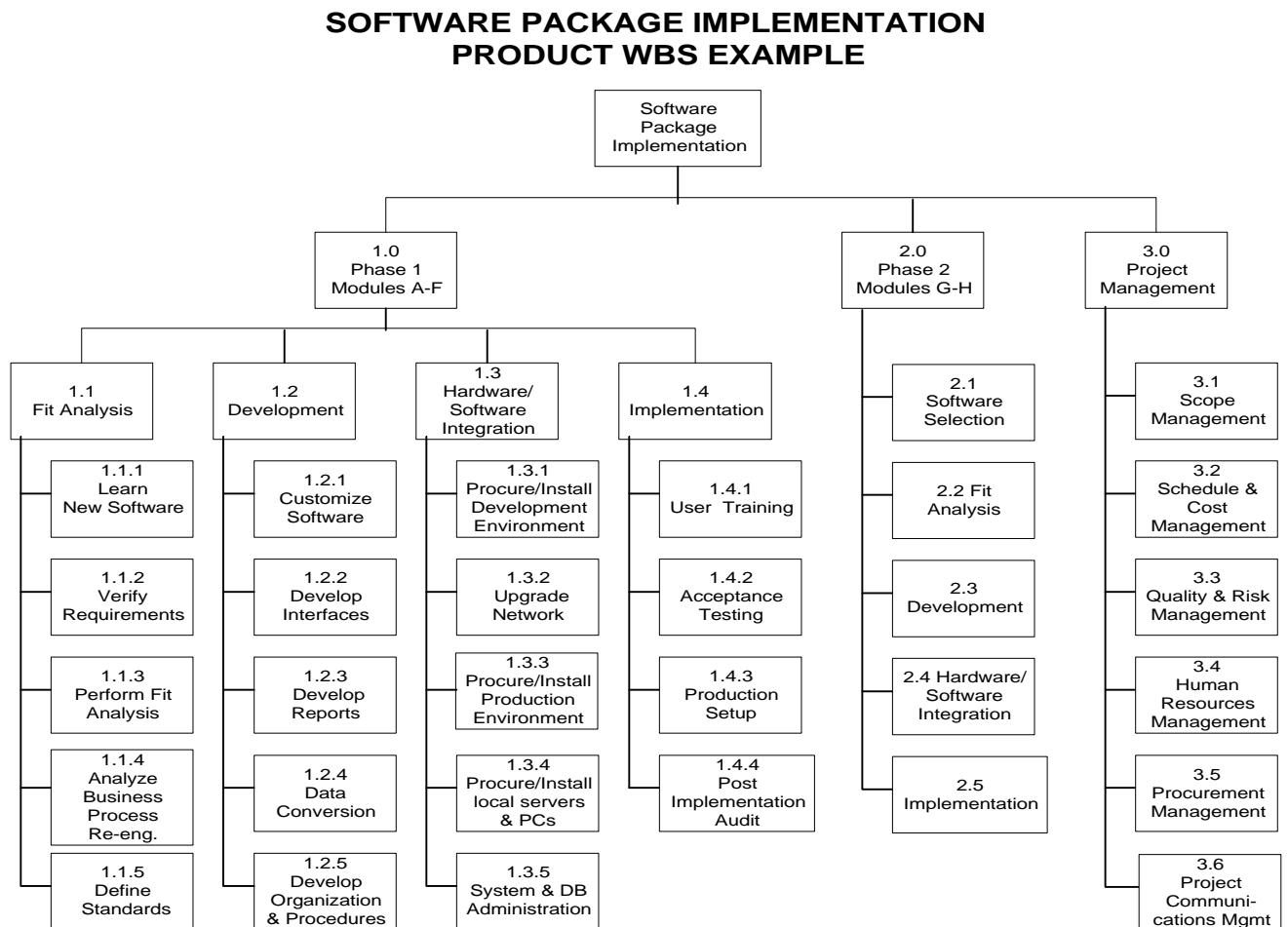


FIGURE 5-2

Scope Definition

The example in Figure 5-3 is a classical Custom System Development project WBS that is structured by function.

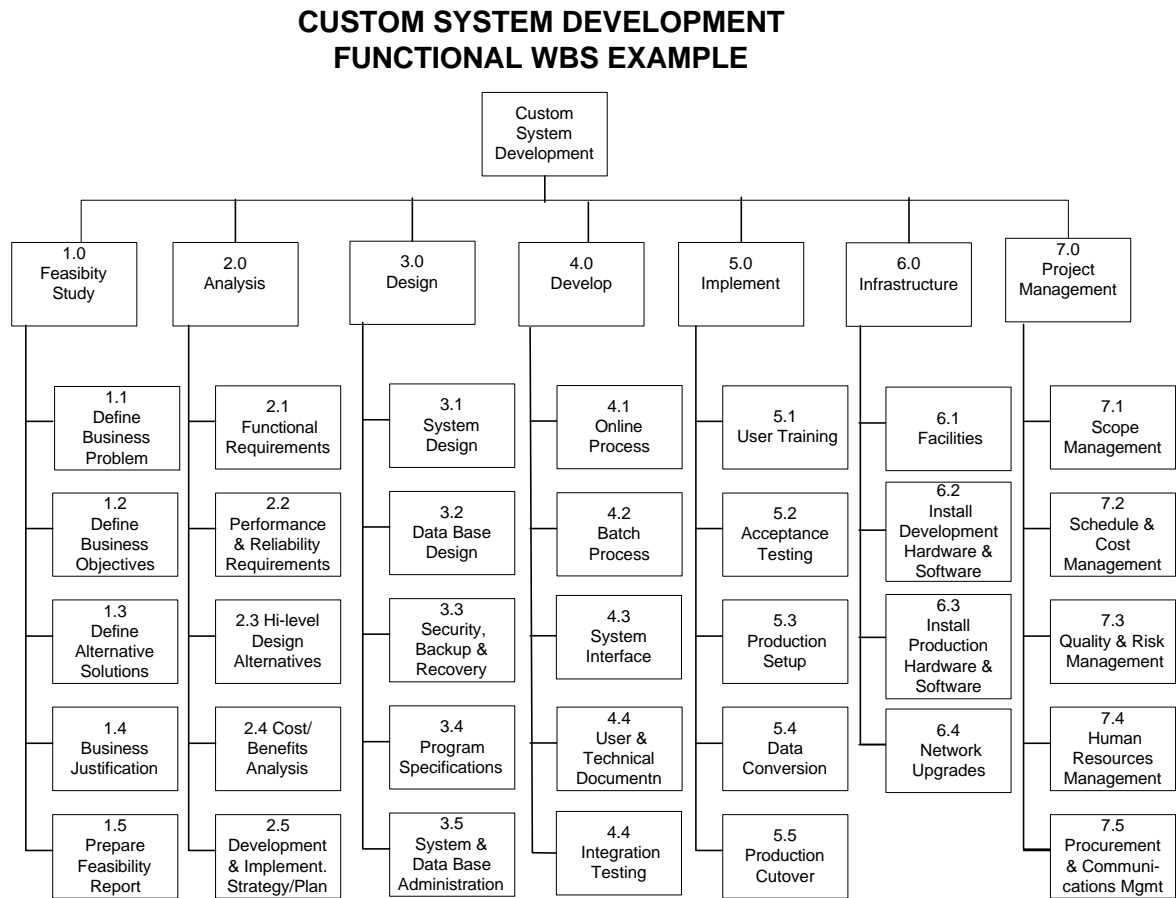


FIGURE 5-3

The top level of this WBS consists of the classical phases of the system development process, each of which generates deliverable items. In addition, Project Management and its related activities are included in the WBS as tasks.

Scope Definition

FORM OF WBS

The high-level WBS can be presented as a diagram and/or in the form of an indented list (outline format). This format fits easily into scheduling tools such as Microsoft Project. However, it does not communicate the total project view as well as the hierarchical WBS diagram.

The Custom System Development WBS is shown below as an indented list or an outline format.

CUSTOM SYSTEM DEVELOPMENT

- 1.0 Feasibility Study
 - 1.1 Define Business Problem
 - 1.2 Define Business Objectives
 - 1.3 Define Alternative Solutions
 - 1.4 Business Justification
 - 1.5 Prepare Feasibility Report
- 2.0 Analysis
 - 2.1 Functional Requirements
 - 2.2 Performance & Reliability Requirements
 - 2.3 Hi-level Design Alternatives
 - 2.4 Cost/Benefits Analysis
 - 2.5 Development & Implementation Strategy/Plan
- 3.0 Design
 - 3.1 System Design
 - 3.2 Data Base Design
 - 3.3 Security, Backup and Recovery Design
 - 3.4 Program Specifications
 - 3.5 System & Data Base Administration
- 4.0 Develop
 - 4.1 Online Process
 - 4.2 Batch Process
 - 4.3 System Interface
 - 4.4 User and Technical Documentation
 - 4.5 Integration Testing
- 5.0 Implement
 - 5.1 User Training
 - 5.2 Acceptance Testing
 - 5.3 Production Setup
 - 5.4 Data Conversion
 - 5.5 Production Cut-over
- 6.0 Infrastructure
 - 6.1 Facilities
 - 6.2 Install Development Hardware & Software
 - 6.3 Install Production Hardware & Software
 - 6.4 Network Upgrades

Scope Definition

7.0 Project Management

- 7.1 Scope Management
- 7.2 Schedule and Cost Management
- 7.3 Quality and Risk Management
- 7.4 Human Resources Management
- 7.5 Procurement and Communications Management

VALIDATE THE WBS

Since it is easy to overlook needed deliverables, it is important to validate the initial WBS.

To validate the correctness of the WBS decomposition, the project team should ask the following questions:

- Does the list of deliverables thoroughly describe and satisfy the project Scope Statement?
- Do all deliverables fall within the project Scope Statement?
- Would the customer be happy to receive these and only these deliverables?
- Can each deliverable be cleanly assigned to a single individual or organization?
- Are the deliverables described in a clear and unambiguous manner?

If the answers to any these questions are “no”, then the appropriate additions, modifications, and deletions should be made.

The final WBS should be reviewed with technical subject matter experts and experienced project managers who may have insights from their experiences on similar projects that could be valuable for the team to consider.

Finally, the WBS should be reviewed with the project sponsor and intended customers. Project sponsors are often not fully aware of the magnitude of the effort needed to fulfill the project and can gain a more realistic understanding of what is involved when they examine the full WBS.

TASK DEFINITION STATEMENT

Every task or work package on the WBS must have a **Task Definition Statement** that contains the following suggested information:

- Task name
- Purpose
- Key Assumptions
- Approach
- Responsible Organization
- Responsible Individual
- Task Deliverables
- Task completion criteria, including approvals required.
- Task start and finish/end dates (except for on-going support tasks such as data base administration)

During the Project Scheduling and Resource Planning phases of the planning process, the estimated resource requirements and costs as well as any dependencies on other tasks will be added to these documents to create the detailed WBS and Task Definition Statement.

RELATIONSHIPS AMONG THE PLANNING PROCESSES

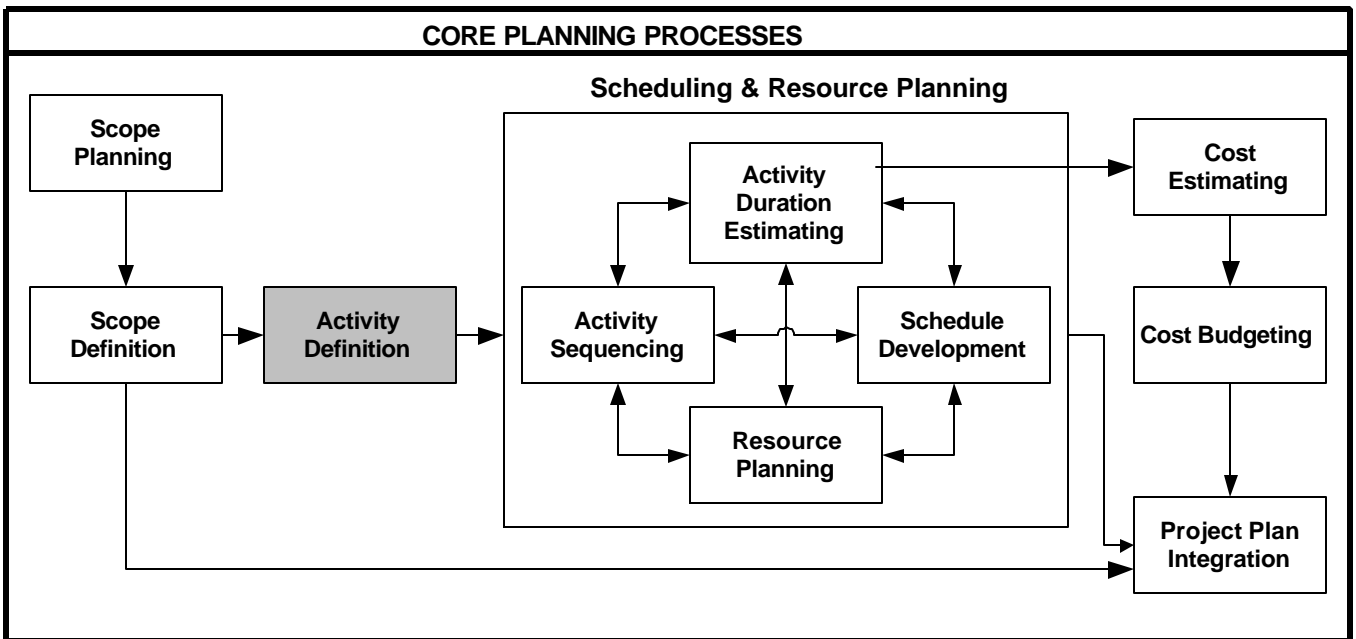


Figure 6-1

Defining Project Activities

Similar to breaking down deliverables in the Scope Definition process, all high level project activities are subdivided into smaller and more manageable sub activities. Activity definition requires decomposing the high-level tasks on the WBS developed in Scope Definition into the detailed tasks or activities that the project manager will use for work delegation and performance measurement. Activity sequencing involves specifying the interdependencies among these tasks and their logical order. Activity sequencing is described in more detail in the Project Scheduling & Resource Planning chapter of the methodology.

The activities are documented in additional layers of the WBS as shown in the following example. The example takes the development task 4.0 from the Custom System Development WBS, Figure 5.3 in Scope Definition, and breaks it into its component parts.

Activity Definition

CUSTOM SYSTEM DEVELOPMENT WBS EXAMPLE

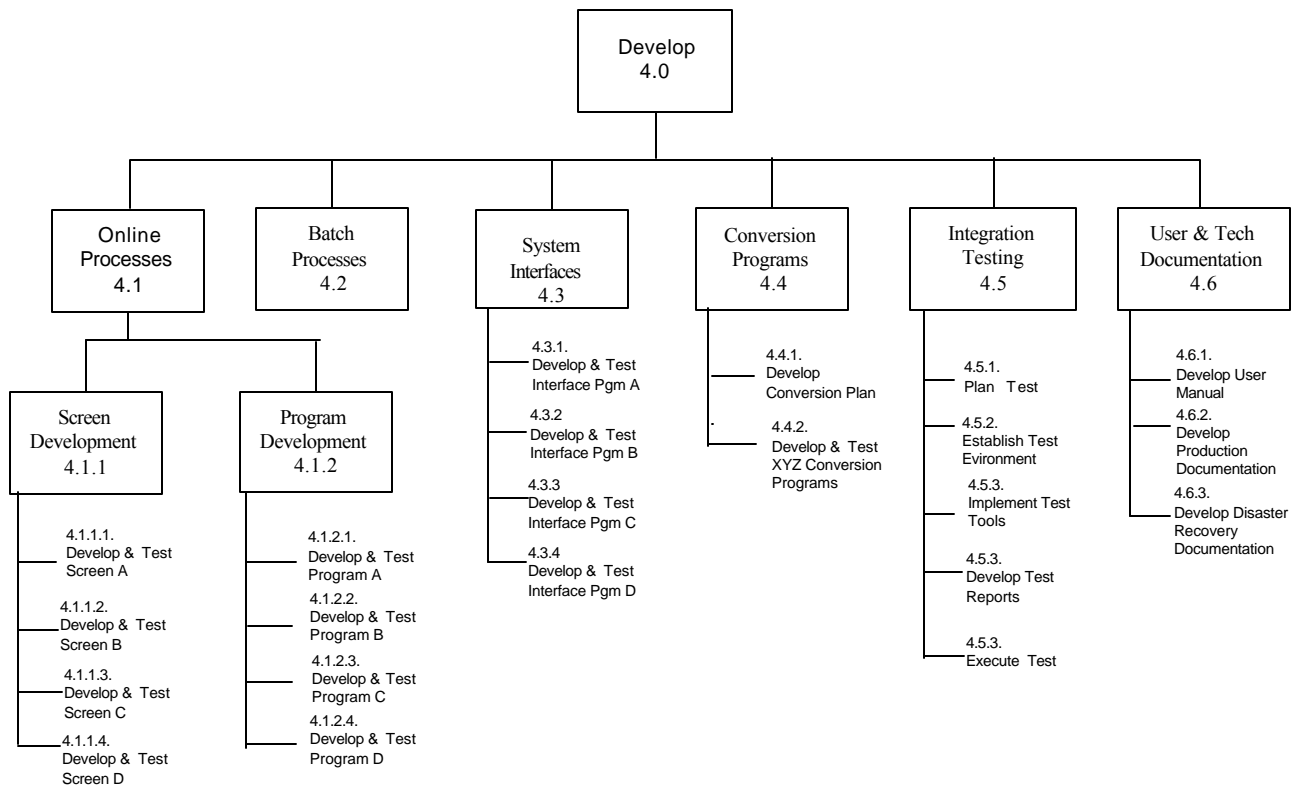


Figure 6-2

In the above example, the “develop” task 4.0 is broken down into individual work packages. Establishing the test environment, task ID 4.5.2, is a task that impacts all the programming effort. To show that developing the WBS is as much an art as a science, the “Establish Test Environment” task could be placed one level higher in the WBS, and applied to the online process, batch process, system interface, and conversion programs.

Activity Definition

ANOTHER WBS EXAMPLE

Source: State of California DOIT

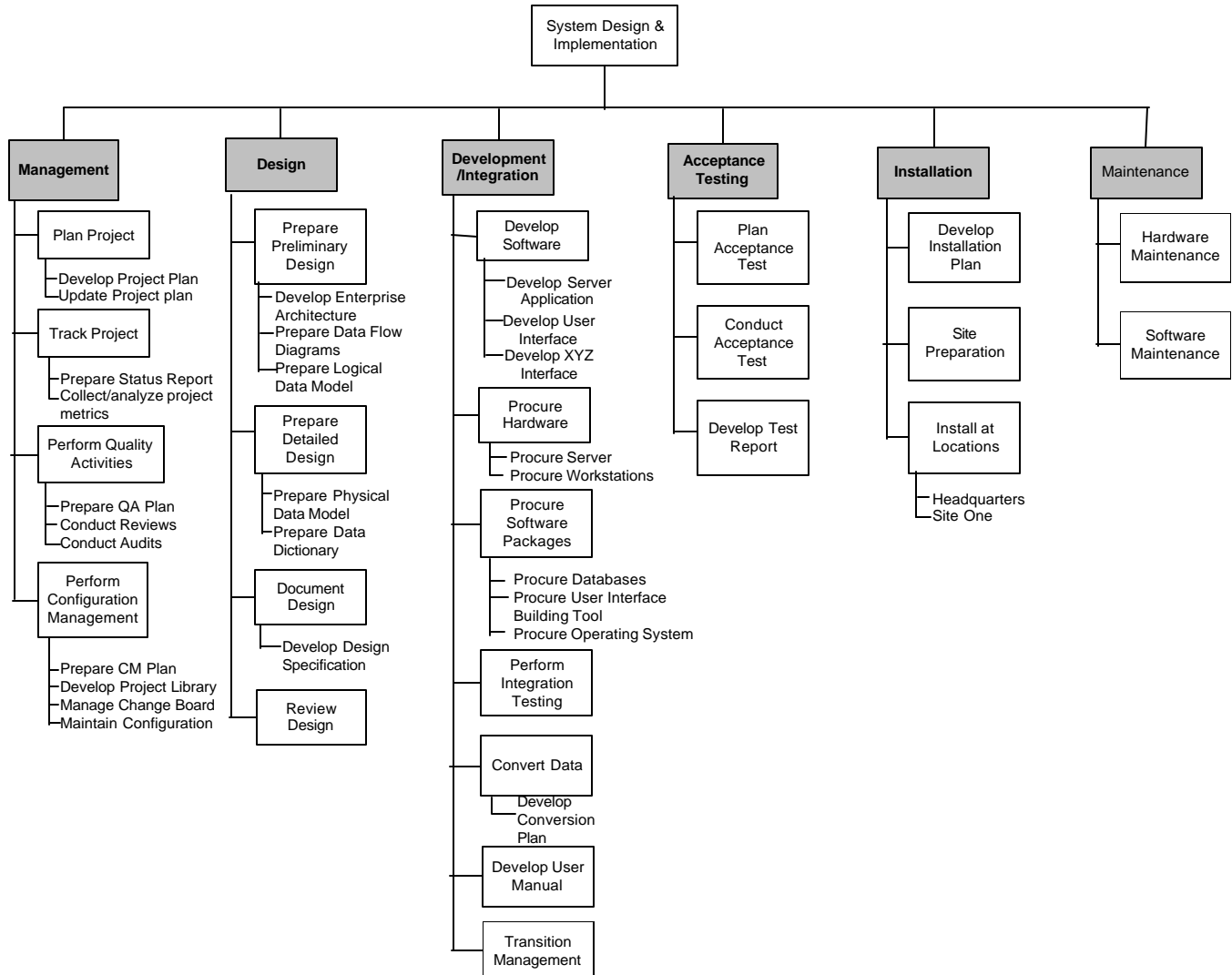


Figure 6-3

Activity Definition

WBS Guidelines

There is no simple formula to define how much detail should be included in a work breakdown. Here are some helpful guidelines for completion:

WBS Guidelines:

- Break down [decompose] the work until accurate estimates of cost and resources needed to perform the task are provided.
- Ensure that clear starting and ending events are defined for the task.
- Verify that the lowest level tasks can be performed within a “reasonable” time schedule. If the time to complete a task is too long, an accurate project status in the implementation phase may not be possible. An industry standard rule of thumb is to make work packages that can be completed in timeframes of three weeks or less.
- Each task must have one clearly identified responsible organization and person. At the bottom of the WBS a single person or more than one person will work on a task. At higher levels in the WBS, several people and even organizations may work on a task, but the lead organizational and individual must always be identified.
- Verify that all staff on the project are assigned a WBS task(s). Has a firm rule: if the task is not on the WBS, it is not worked on.

Figure 6-4

Activity Definition

Work Package Decomposition Checklist

The following checklist provides guidance regarding the need to further decompose the work contents of the project.

<p style="text-align: center;">Should the Work Package be Decomposed Further?</p> <p style="text-align: center;">The greater the number of positive answers to the following questions, the stronger the justification for breaking down the work package.</p> <ul style="list-style-type: none"><input type="checkbox"/> Is there a need to improve the accuracy of the cost and duration estimates?<input type="checkbox"/> Is more than one individual responsible for the work?<input type="checkbox"/> Does the work content include more than one type of activity?<input type="checkbox"/> Is there a need to know precisely the timing of activities internal to the work package?<input type="checkbox"/> Is there a need to cost out activities internal to the work package?<input type="checkbox"/> Are there any significant time breaks in the execution of the internal activities?<input type="checkbox"/> Do resources requirements within the work package change over time?<input type="checkbox"/> Do the prerequisites differ among the internal activities?<input type="checkbox"/> Are there any acceptance criteria applicable before the completion of the entire work packages?<input type="checkbox"/> Are there any specific risks that require focused attention?
--

Figure 6-5

PMI Journal

WBS Evolution

The WBS evolves in increasing detail as a project progresses. For example, the detailed tasks for system implementation are not defined in the requirements analysis phase. Instead they are usually defined concurrently with development. As activities and plans are defined in more detail it may become apparent that the high-level WBS, which was developed during the Scope Definition, needs to be changed. However, such changes should only be made under formal change control or the project scope could be changed unwittingly.

Activity Definition

The level of detail of the WBS also evolves over the project life cycle. At the beginning of a project a high level WBS for the whole project must be prepared in order to understand the scope of the project and to estimate the resource requirements and prepare the budgets. The detailed WBS for each project phase may not be prepared until the beginning of the phase because not all the required information is available at earlier time.

The WBS has multiple uses. It is both a task list for planning and a structure for providing report status during the design and implementation phases. As individual detailed tasks are completed, the project progress is assessed. It also serves as a useful management communication tool by which actual results can be compared with original expectations.

TASK DEFINITION STATEMENT

Every task or work package on the WBS must have a detailed **Task Definition Statement** that contains the following information:

- Task name
- Purpose
- Key Assumptions
- Approach
- Responsible Organization
- Responsible Individual
- Task Deliverables
- Task completion criteria, including approvals required
- Task start and finish/end dates

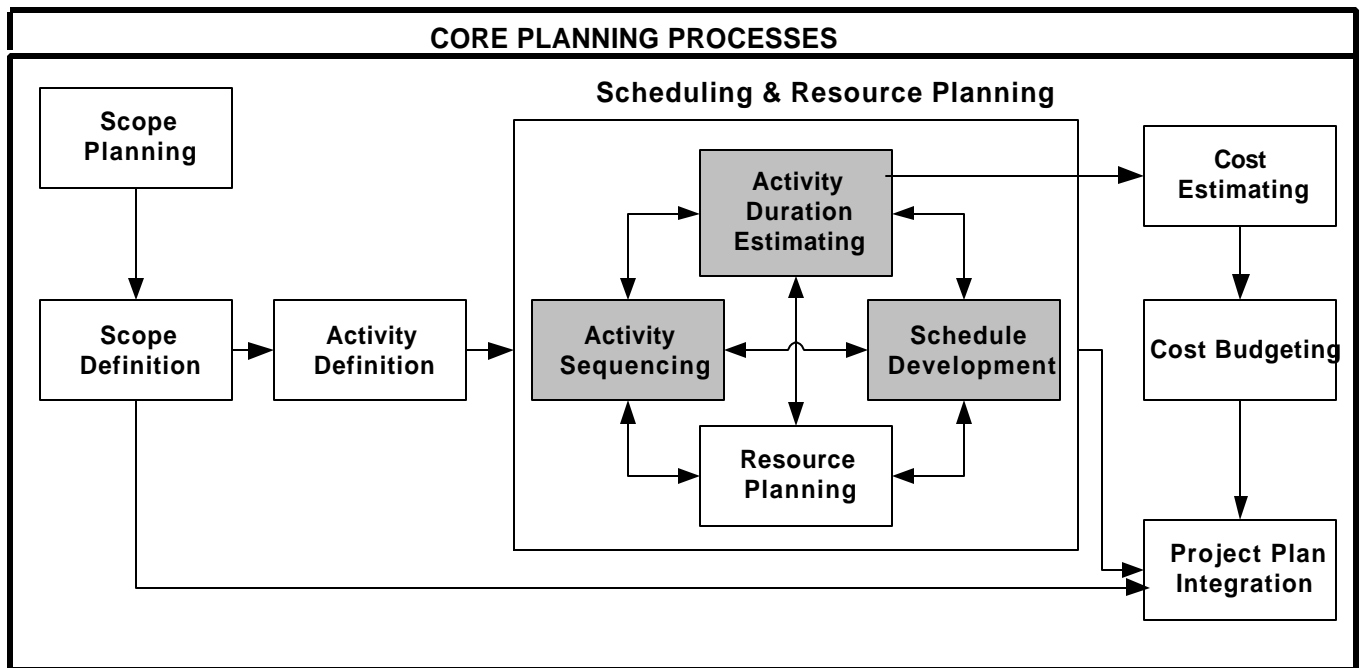
Later in the planning process the estimated resource requirements and costs as well as any dependencies on other tasks can be added to this document.

Judgment should be applied to keep the task statements as simple as possible, particularly at the most detailed level of the WBS. For a programming task, the approach can be as simple as “Develop and test program A per spec # 9”.

Project Scheduling

Overview of Project Scheduling

The core planning processes that encompass Scheduling are shown as shaded boxes in Figure 7-1 below.



Project Scheduling and Resource Planning Context
Figure 7-1

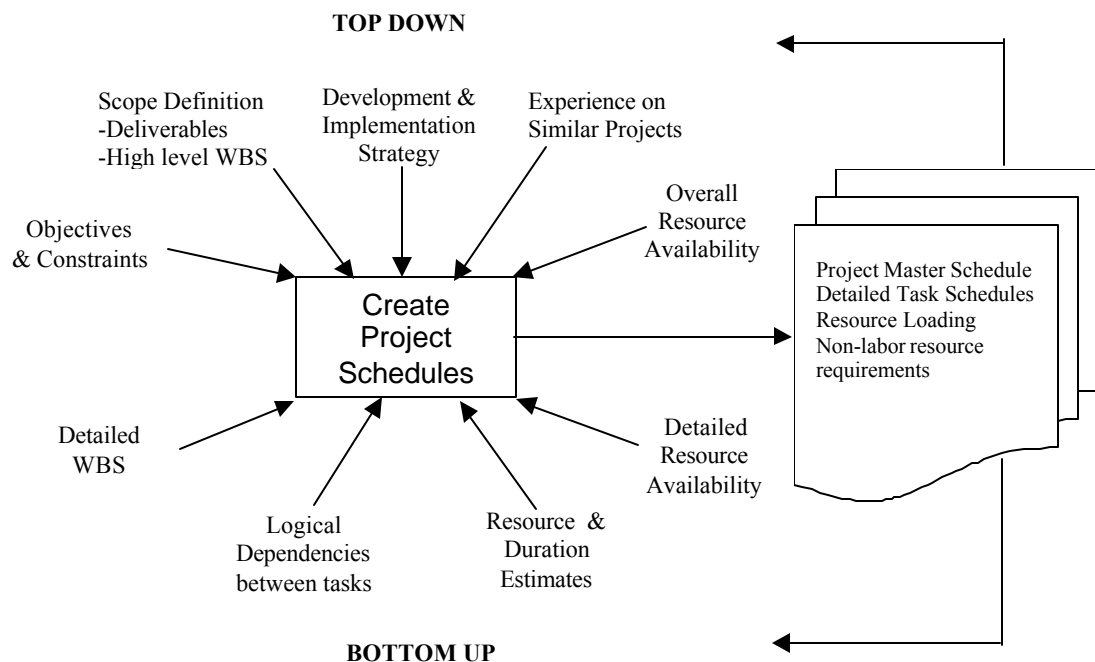
Following the definition of project activities, a project schedule is developed by associating resources and time with the activities. The project schedule provides a graphical or tabular representation of when tasks will start, when tasks will be completed, when significant events (called milestones) will occur, logical dependencies between tasks, and resource requirements. It is very important that the definition of completion criteria for each task is documented and clear. Otherwise the dates on the schedule will not be meaningful.

Project scheduling and resource planning are inextricably intertwined. A realistic schedule must be supported by a realistic staffing plan, with the right mix of critical skills available at the right time. The outputs of the combination are the project schedule in the form of a Gantt chart, or equivalent, and time phased resource requirements. Resource planning in Chapter 8 discusses activities that are required to acquire the necessary resources including skilled staff and needed equipment. These tasks, in the City environment, are usually on the critical path and must be shown on the master project schedule.

Project Scheduling

Several iterations of project scheduling and resource planning may be required to balance the schedule and the available resources. If a satisfactory balance that meets management goals and project commitments cannot be achieved, Scope and Activity Definitions may need to be revisited.

Project scheduling is accomplished at two levels as shown in Figure 7-2 below.



Project Scheduling Process
Figure 7-2

In the early stages of a project a high level master schedule (target) is developed top down. The top-down process starts with the output of Scope Planning, including project objectives, constraints, the project scope and development and implementation strategies. The master schedule is developed based on the above items, together with the project manager's and project team's experiences. The master schedule provides a framework for the development of the detailed schedule.

A master schedule is usually developed before all the activities have been defined and before the entire project team members are on board. In this case, a schedule review by the new team members is essential. This may uncover necessary changes to the schedule, resources and costs. Therefore, it is important to build in sufficient time and cost contingencies in the early planning activities.

Project Scheduling

The detailed schedule is a bottom-up process that starts with the WBS and task statements developed in Scope Definition and Activity Definition. The schedule is developed by combining and balancing duration estimates for each task, task inter-dependencies, and the available resources into a logical, time-phased plan.

Initially the project manager may find that the available skilled staff and other resources are insufficient to complete the project by the target completion date. Thus, the scheduling process becomes iterative to balance the objectives, scope and resources to create an achievable schedule that meets the overall business objectives of the stakeholders. Unsatisfactory results from the scheduling process may cause the scope definition, activity definition and resource estimates to be reviewed and modified.

The scheduling process requires the following steps which are described in more detail below:

- **Identify the major project milestones for the master schedule**
- **Sequence the activities based on their logical dependencies**
- **Estimate the task duration and resource requirements for each activity**
- **Develop an initial project schedule by assigning resources and time-frames to the activities**
- **Identify the critical path**
- **Tune the schedule to achieve the objectives while balancing or smoothing the resource requirements**
- **Document the assumptions**
- **Assess the risks inherent in the assumptions and in the resource estimates**
- **Review the schedule with the stakeholders and make modifications as necessary**

Identify Major Milestones

The completion of an important action is denoted as a milestone. Milestones are important events that happen at a point in time and have no duration. For example, deliverables are often represented as milestones, while efforts to produce the deliverable are referred to as tasks.

While milestones are unique to each project, some typical project milestones are shown below:

- **Requirements Approval**
- **End-of-Phase Review**
- **Prototype Approval**
- **Approval of Design**
- **Hardware and/or Software Installed and Tested**
- **Unit Test Completed**
- **Integration Test Completed and Approved**
- **Acceptance Test Completed and Approved**
- **System Acceptance by User**
- **Production Implementation**

Project Scheduling

A milestone can occur at the end of a work package in the WBS and serve as a measurable item in the baseline plan. Major project milestones should be included on the master schedule.

For contracted work, a milestone is often used as a point in the project where an interim payment is made. If this approach is used, mutual agreement is necessary on the content of the milestone and the payment associated with that milestone.

Sequence the Activities

To create the project schedule, the precedence relationships among activities must be defined. One way to determine the precedence of activities is to ask question “what other activities must (or should) finish before this activity can start?”

Two basic kinds of logical dependencies need to be considered when sequencing project activities:

- *Mandatory dependencies* are those which are inherent in the nature of the work being done. For example, requirements definition comes before design that comes before programming. However all requirements need not be completed before design can start, and not all design must be completed before some programming can start. Therefore, task dependencies must be defined at a more detailed level.
- *Discretionary dependencies* are those that are defined voluntarily by the project manager in order to, for example, support the use of best practices, limit parallelism and complexity in the project plan or take into account the known resource limitations. An example of a resource driven dependency is when you have only one person with a particular skill available, which results in doing tasks in series when, with more skilled staff, the tasks could be done in parallel.

One way to develop and present the task dependencies is the network diagram. Network program is a good tool for thinking through and presenting the basic task dependencies. An example is a simple network diagram is shown below in Figure 7-3. The network diagram is the foundation of the PERT (Program Evaluation and Review Technique) diagram that will be discussed later in this chapter.

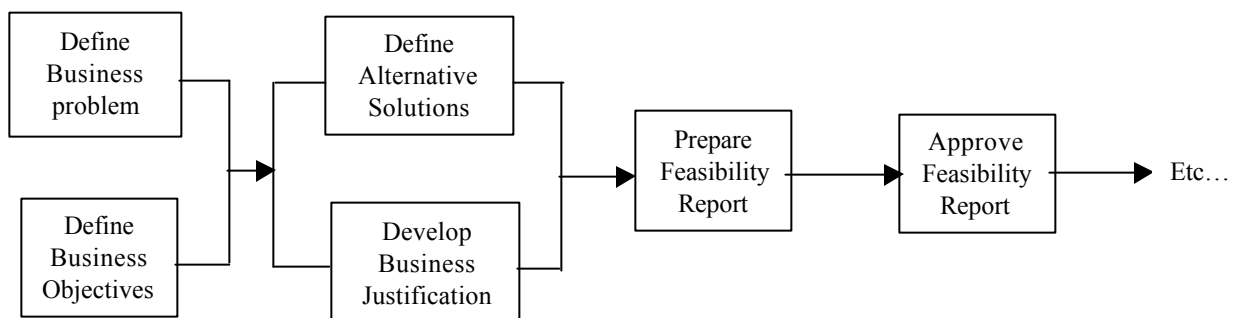


Figure 7-3 Sample Network Diagram

Project Scheduling

The Gantt Chart in Figure 7-4 and the Spreadsheet in Figure 7-5 are other ways of developing and showing project task dependencies.

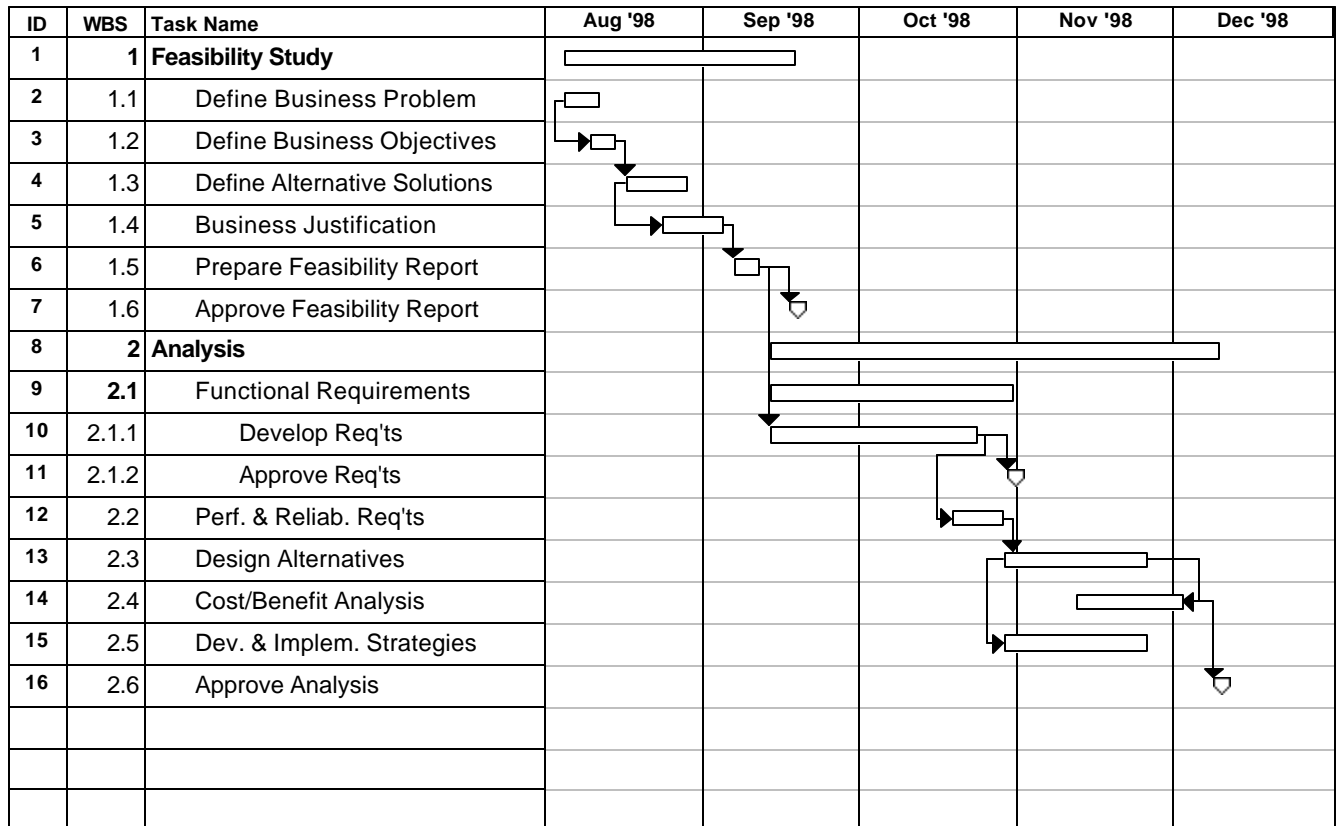


Figure 7-4

Gantt Chart with Task Dependencies

The above example illustrates several types of task dependencies.

- **Finish-to-Start:** It is the most commonly used in schedule development. In this dependency, the “from” activity must finish before the “to” activity can start. For example, Define Alternate Solutions, WBS item 1.3, can’t start until Define Business Objectives, WBS item 1.2, is finished.

Project Scheduling

- A variation on this is “Finish-to-Start with a delay”. The Feasibility Report, WBS item 1.6, will be approved 5 days after the report has been completed. Approval is shown as a milestone rather than as a 5-day task because no project resources are used in this process. It is just a time delay.
- Another variation is “Finish-to-Start with overlap”. Performance and Reliability Requirements, WBS item 2.2, can start a week before Develop (functional) Requirements, WBS item 2.1.1, has finished, which says the tasks will overlap by a week.
- Start-to-Start (with or without delay or overlap): The “from” activity must start before the “to” activity can start. The Define Business Objectives, WBS item 1.2, can start 3 days after Define Business Problem, WBS item 1.1, has started.
- Finish-to-Finish (with or without delay or overlap): The “from” activity must finish before the “to” activity can finish. The Cost Benefit Analysis, WBS item 2.4, cannot finish until 5 days after Design Alternatives, WBS item 2.3, has finished.
- Start-to-Finish: The “from” activity must start before the “to” activity can finish.

The task dependencies can be shown on the spreadsheet below using Microsoft Project Task Sheet format.

ID	WBS	Task Name	Duration	Start	Finish	Predecessors
1	1	Feasibility Study	33 days	8/5/98	9/18/98	
2	1.1	Define Business Problem	5 days	8/5/98	8/11/98	
3	1.2	Define Business Objectives	5 days	8/10/98	8/14/98	2SS+3 days
4	1.3	Define Alternative Solutions	10 days	8/17/98	8/28/98	3
5	1.4	Business Justification	10 days	8/24/98	9/4/98	4SS+5 days
6	1.5	Prepare Feasibility Report	5 days	9/7/98	9/11/98	5
7	1.6	Approve Feasibility Report	0 days	9/18/98	9/18/98	6FS+5 days
8	2	Analysis	63 days	9/14/98	12/9/98	
9	2.1	Functional Requirements	35 days	9/14/98	10/30/98	
10	2.1.1	Develop Req'ts	30 days	9/14/98	10/23/98	6
11	2.1.2	Approve Req'ts	0 days	10/30/98	10/30/98	10FS+5 days
12	2.2	Perf. & Reliab. Req'ts	8 days	10/19/98	10/28/98	10FS-5 days
13	2.3	Design Alternatives	20 days	10/29/98	11/25/98	12
14	2.4	Cost/Benefit Analysis	15 days	11/12/98	12/2/98	13FF+5 days
15	2.5	Dev. & Implem. Strategies	20 days	10/29/98	11/25/98	13SS
16	2.6	Approve Analysis	0 days	12/9/98	12/9/98	14FS+5 days

Figure 7-5
Task Dependencies Spreadsheet

The logical sequencing of activities by defining task dependencies requires a lot of judgment because it has a major impact on the project schedule. As the project plan evolves, the Project Manager may have to add, delete or change dependencies in order to meet the project schedule objectives. Understanding the relationships among the tasks and clearly defining the task priorities are an effective tool to help resolve many scheduling and/or resource conflicts.

Project Scheduling

Estimate Task Duration and Resource Requirements for each Activity

The quality of a schedule is completely dependent on the accuracy of the activity resource and duration estimates. It is important that estimates are owned by the people who must live with the results. Management can provide objectives and guidelines, but, if the team members responsible for a task do not buy into the estimate, it is very unlikely that the task will be completed on time or within budget.

The estimation process is complex because activity duration is affected by numerous variables that must be dealt with concurrently in the planning phase. Some of these variables include staff availability, the skill level of the person assigned to the task, unexpected events, efficiency of work time, and mistakes and misunderstandings during the development of the project.

Estimates are only estimates and are not perfect. Reasonable, achievable, task duration estimates are important in maintaining good customer relations and team morale. Task duration is rarely over-estimated, but is frequently under-estimated. This can result in an increase in the "frenzy level" of a project. The frenzy escalates as the technical staff scrambles to complete a project in an unrealistic timeframe. When that is not successful, the sponsors have to scramble for more money. The end-result is often cutting corners, excessive overtime, and a dissatisfied customer. One way to minimize this is to build some contingency in the plan to allow for the normal estimating errors and for unforeseen circumstances.

Task duration is a combination of the number of hours by skill type required to complete the task and the number and skills of the staff assigned to the task. Doubling the staff on a given task may not halve the duration. When estimating the duration of a task, reality is very important. The knowledgeable scheduler takes into account absenteeism, meetings, discussions, and interaction among the staff. Nobody is 100% productive every hour of the workday. If a scheduled task assumes 100% productivity, the schedule rapidly falls apart. A successful schedule builds these types of factors into the duration estimates. It is therefore very important for the project manager/scheduler to take into account the work history and culture of the department. This is especially true with the City projects.

As discussed in Activity Definition, the work should be decomposed into tasks of one to two week duration for progress to be tracked effectively. Several techniques exist to support task duration estimation. The most common technique is based on the historical experience of a similar scope of work performed by the estimator. Collected and archived historical project data are used successfully by many organizations to achieve quality performance on project deliveries.

Historical records support both the duration and the cost estimations that are so important in this phase. Data based on staff skills are far more valuable than generalized "industry" estimates. If historical data does not exist, the project manager should seek the advice of experts and others who have completed similar tasks.

When historical data or experts are not available, use a technique of getting estimates from multiple sources, comparing results and estimating the duration based on the multiple inputs. The nature of this method is predicated on finding good sources for providing the estimates. Again, it may be wise to add a contingency to such estimates.

Project Scheduling

Develop an Initial Project Schedule

Schedule development means determining start and finish dates for project activities. If the start and finish dates are unrealistic the project is unlikely to be completed on schedule. The dates must take into account:

- The task dependencies determined in Activity Sequencing
- The resource and duration estimates
- The availability of resources
- The past experience of the project manager and the project team
- Contingency for unknowns and for risk management

Many City projects are dependent on three time-consuming processes over which the Project Manager has very little control, such as:

- Obtaining the project funding approvals from the Mayor's Office and the City Council
- Acquiring additional staff
- Negotiating contracts

It is important to include these processes with realistic time estimates in the project schedule and obtain the active support of the Executive Sponsor to expedite the processes to meet the schedule. It may take 6 months to a year to obtain funding for a major project. The time needed for staff acquisition depends on many factors including the status of the eligibility list for the open positions or whether contractors can be used rather than City employees. Contract negotiations may take 1-3 months depending on the size and complexity of the contract, and the priority arranged with the City Attorney's Office.

Project Scheduling software such as Primavera, Project Workbench, or Microsoft Project can be used to create a project schedule. This methodology does not attempt to instruct the reader in how to use each of the tools. Each software has ways to input task dependencies, resource estimates, resource assignments, and planned start and completion dates. The following sample project schedules were created using Microsoft Project 98.

Project Scheduling

The type of schedule associated with a project relates to the complexity of the implementation. For large, complex projects with a multitude of interrelated tasks, a PERT chart (or network diagram of the activities) may be used. PERT charts depict interdependencies and associations and allow planning to include these relationships. A sample PERT chart is shown below.

Sample PERT Chart

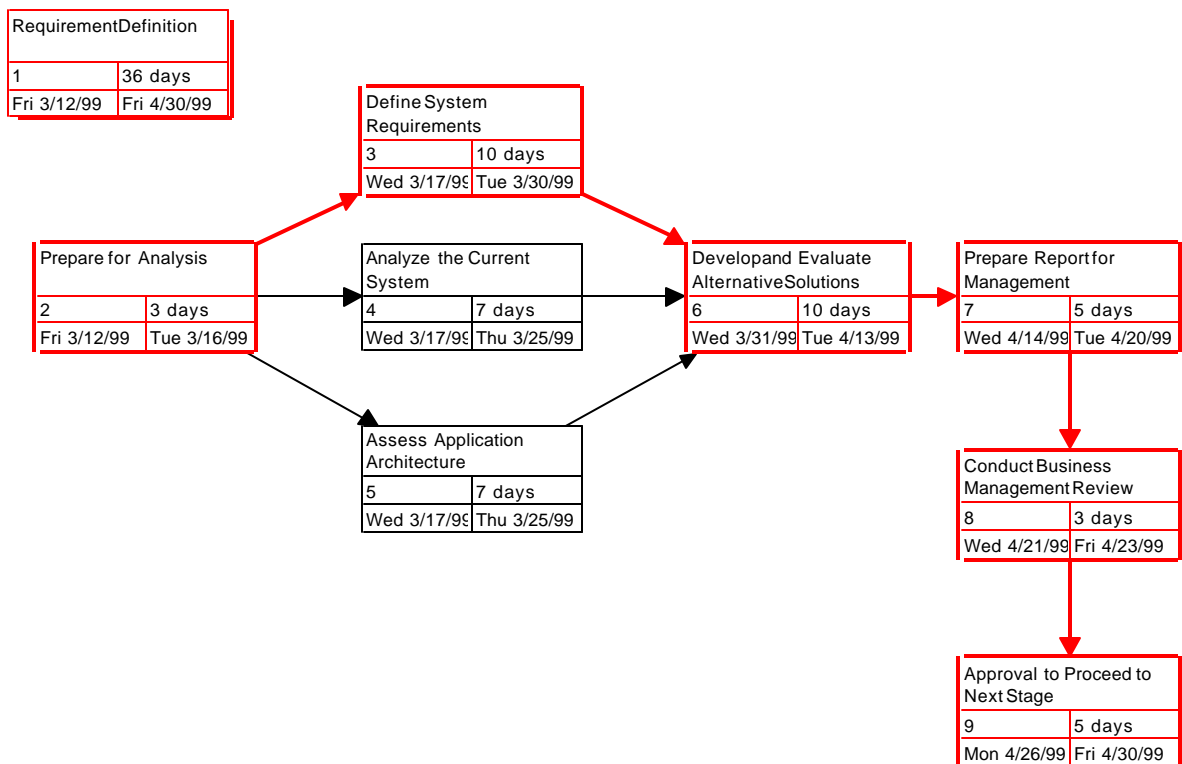


Figure 7-6

Project Scheduling

For most City information technology projects, a Gantt chart (or bar graph) is the easiest way to present a schedule. A sample Gantt chart is shown in Figure 7-7.

Sample Gantt Chart

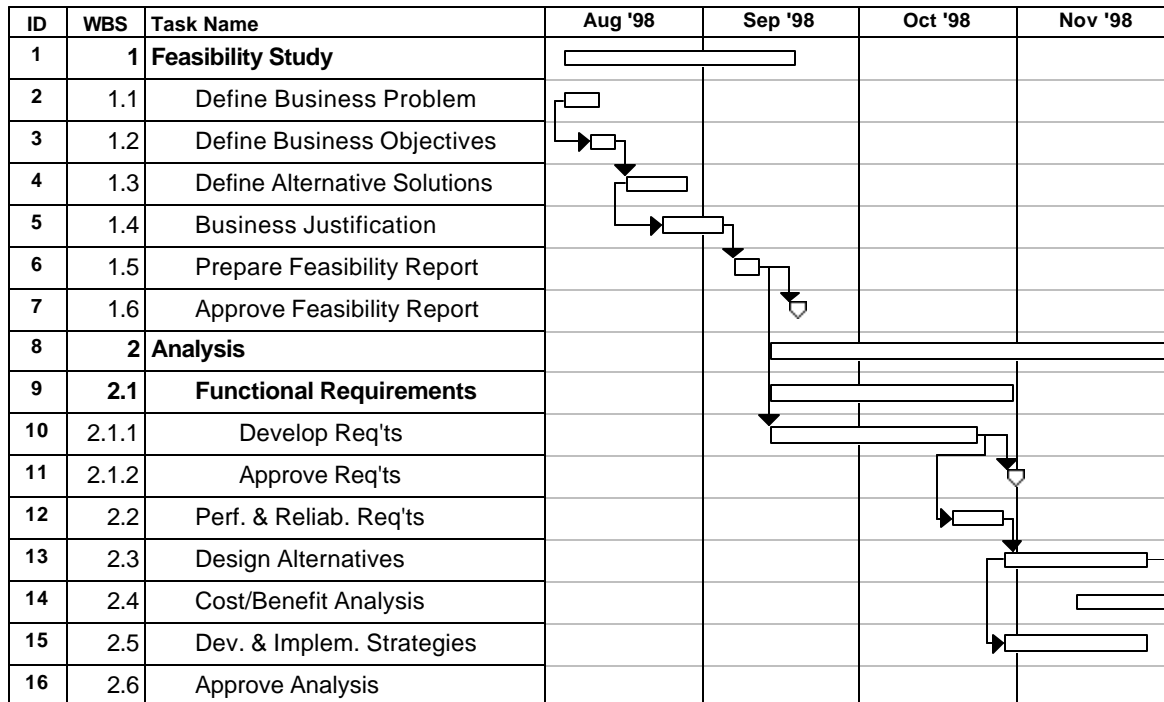


Figure 7-7

The legend in the above Gantt chart is:

1. Tasks and summary tasks are shown as rectangular bars.
2. Milestones are shown as "home plates".
3. Summary tasks can best be identified by the WBS numbers, or by indenting tasks that are below them in the WBS structure. Some tools, like Microsoft Project, automatically show summary task names in bold font, as in the above example.

Project Scheduling

Identify the Critical Path

The critical path is the sequence of tasks that defines the longest path through a project. It determines the earliest possible completion of the work. The critical path is carefully managed because if the critical path tasks slip, the entire project is delayed.

Project management tools such as Primavera, Project Workbench, or Microsoft Project will identify the critical path for the project. A key to project planning is to keep as many tasks as possible off the critical path in order to provide management flexibility throughout the project. The tasks on the critical path must be the focus of attention and be managed carefully throughout the project in order to minimize project delays.

Tune the Schedule

The initial project schedule seldom meets all of the project objectives and constraints. It must usually be reviewed and tuned in order to:

- Meet the desired completion date
- Smooth the resource loading
- Reduce the number of tasks and the length of the critical path
- Adjust for changes in planning assumptions, including resource availability
- Reduce the project risk

Schedule tuning is accomplished by:

- adjusting resource assignments
- changing discretionary task dependencies, such as putting some tasks in parallel that were sequential
- changing the technical approach and estimate for selected tasks

Project Managers constantly face the challenge of shortening the schedule without changing the project scope. This is normal because the desired completion date is often earlier than the date resulting from the preliminary schedule. Methods to shorten the schedule include:

- Fast tracking: doing activities in parallel that would normally be done sequentially
- Crashing: analyzing cost and schedule tradeoffs to determine how to obtain maximum schedule compression at the least incremental costs, including such techniques are:
 - Transferring qualified people from tasks with float to activities on the critical path in an attempt to reduce the duration of critical path activity;
 - Scheduling overtime or additional shifts;
 - Subcontract work as a means increasing available resources and opportunities for parallel work.

However, it is very important to recognize that including the above techniques in the initial project schedule increases the risk significantly.

Project Scheduling

Document the Assumptions

Since all schedules are built upon currently available knowledge, projections, and assumptions, it is important to document the key assumptions for validation and later reference.

Assumptions typically include the availability of key resources, timely performance of outside contractors, accuracy of system requirements, and availability of enabling technology, etc.

If, for example, a schedule is shortened based on the assumption that a highly skilled person will be performing the work, that assumption should be documented. Then, if a less skilled person is actually assigned to perform the task, the project manager can recognize the risk and make the necessary changes and decisions. Without documentation of the assumption, the schedule could be placed in jeopardy later without the project manager realizing it.

Identify Risks and Plan for Contingencies

Scheduling with limited resources has inherent risks. Good scheduling makes allowances for risks in one or more of the following ways:

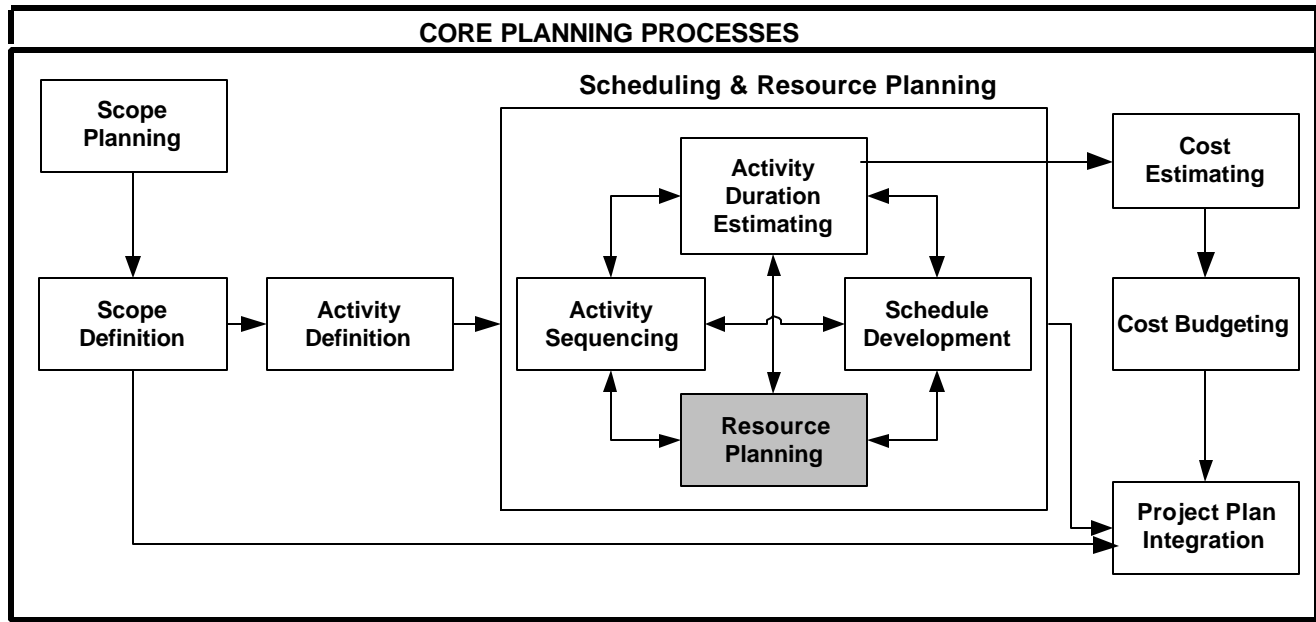
- Where significant schedule risks exist, add an additional contingency task on the WBS for risk management/risk reduction, so that financial reserves can be set aside to deal with potentially delayed schedules.
- Add additional time to those tasks with significant potential risk. There is no rule of thumb for this multiplier; it depends on the degree of risk and overall importance of the schedule to the project.
- Add a percentage time multiplier to the schedule for particular individuals, particularly if new technology is being used or if the person providing the estimate is an extremely optimistic person.

Review the Schedule

The development of a schedule requires input from more than one person. No one possesses all the knowledge or understanding of all the factors that affect schedules in every aspect of a project. A schedule review also facilitates buy-in to the schedule. Buy-in to the schedule by the people who will actually perform the work is critical to success. Participation in scheduling gives staff a stake in the outcome of the project. On the other hand, imposed schedules often create frustration leading to frenzy and inevitable schedule slippage.

Once an initial draft of the schedule is complete, the team should perform a schedule review. The activity or task descriptions and the schedule should be reviewed by the people named to do the work who did not participate in the initial estimates, and by independent experts. Task description and task duration should be reviewed for completeness, accuracy and realism.

Resource Planning



Resource Planning Context

Figure 8-1

Overview of Resource Planning

The core planning process that encompasses Resource Planning is shown as the shaded box on Figure 8-1.

As indicated in Chapter 7 – Project Scheduling, project scheduling and resource planning are inextricably intertwined. Every organization has limited resources to perform tasks. One of the primary roles of a project manager is to find ways to successfully execute a project within these resource constraints.

Resource planning involves:

- Determining and acquiring the staffing and skills required to perform the work of the project; and
- Identifying and acquiring the non-labor resources such as tools, equipment, hardware, and software that enable the staff to complete the project.

Resource Planning

Determining the Size of the Team

The successful project manager considers availability of both labor and non-labor resources. Appropriation of funding and procurement of equipment, which require long lead-times often drive the critical path of a schedule. Therefore, it is important to identify the need for these long lead-time items early in the project.

After task staffing requirements and durations are entered into the initial schedule, resource loading by week or month is calculated. The result could be an impossible staffing plan. Time-phased staffing totals by classification may vary in an unacceptable manner, exceeding available resources in some periods and leaving idle resources in others. This is where the real art of scheduling comes into play, as the project manager adjusts task dependencies, priorities and staffing levels to come up with a schedule that has a realistic and smooth staffing plan.

The optimal size of a project team is driven by two principal factors. One is the total number of tasks to be performed, and the other is the effort needed to perform the tasks.

In developing the schedule and assigning the resources, the project manager determines the optimal mix of staff for activities. Large teams require a significant amount of coordination. Adding more people to an activity creates the need for additional communication and may also increase the need for equipment or tools. In fact, a smaller team sometimes can accomplish much more than a larger one in a shorter period of time. The effectiveness of a team also depends on the personalities of the team members and communication and organizational skills of the project manager. If a large team is necessary, the project team may be divided into groups of 3 to 4 people. The groups should be formed based on tasks instead of functional skills.

Determining Required Skills

Finding available staff with the skills required to perform tasks is critical to a project's success. The skills of the people performing the work are directly related to the time needed to perform a task.

It is helpful in the planning process to develop a list of skills required, first for execution of the project, and then for execution of each task. This skill list may then be used to determine the type of personnel required for the task.

The project manager should realistically assess the skills of the available people on the project because skill level has a major impact on the project schedule. Availability of staff with certain specialized skills and experience is usually critical

IT Project Planning

Resource Planning

Identifying Required Non- Labor Assets

to the project success. Necessary skills can also be acquired during the project by training but it will take additional time.

If existing City staff do not have the required skills for the project, the project manager should acquire the necessary skilled staff via contractual services.

All project teams need some tools to successfully complete the tasks assigned to them. In order to schedule resources, the project manager must ensure that both people and necessary equipment are available to support the project.

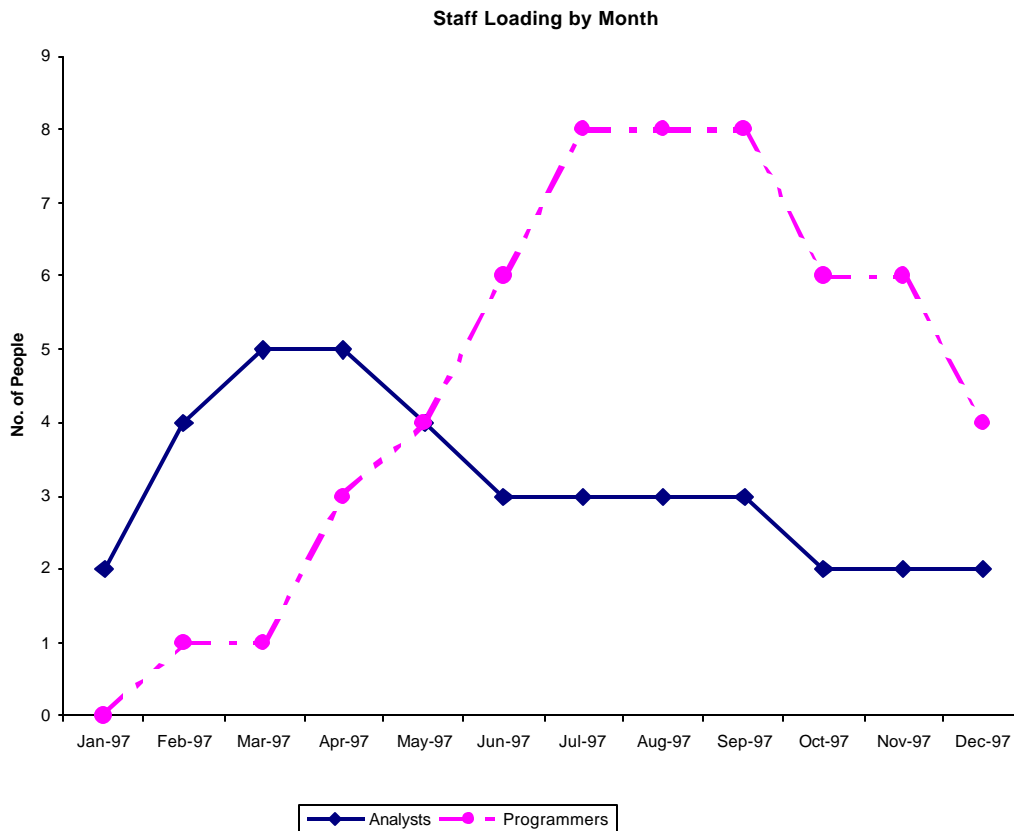
The need for adequate workspace is often overlooked when planning a project. Ideally, the team should be placed in contiguous space to facilitate interaction and communication. Having everyone working in close proximity enhances team spirit and increases the chance for project success. While this may not always be feasible, it is a worthy goal for which to strive.

In addition to workspace, equipment for the team should be included in the plan. Ensuring the availability of equipment at critical points in the project is extremely important in planning a successful project. Efficiency and morale are negatively affected by unavailability of equipment needed to perform a task.

Define Resource Profiles

A staffing plan needs to be developed for every project. The staffing plan identifies when staff is brought onto and removed from the project team. For small projects, this may be simply stated as assigning three full time people to the project throughout its six-month duration. For large projects, the problem is much more complex, and the creation of a detailed plan is a requirement.

Resource Planning



Staffing Plan Example
Figure 8-2

Figure 8-2 shows the number of people required each month for a project. Resource loading needs to be done by skill classification. In the example, analysts are viewed separately from programmers. Projects are usually dependent on the availability of a few key individuals with special functional or technical skills. In that case, resource loading may need to be done by individual for those key people.

The graphic representation of staffing plan helps point out peaks and valleys in staffing that can cause serious project management problems. The project manager should explore various staffing alternatives to find ways to maintain a relatively consistent staffing level. Particular attention should also be paid to releasing resources when they are no longer needed on the project.

Resource Planning

Document Staffing Assumptions

Documenting the staffing assumptions made in resource allocation is necessary to ensure the success of the project. Without clear documentation of these assumptions, later changes in staffing can be difficult and risky.

If, for example, a key person with a special technical skill was assumed to be available in the plan, the assumption must be documented. Later, if for some reason that resource is unavailable to perform the task, the project manager can immediately recognize the risk and make necessary decisions. Without documentation of the assumption, the project manager may fail to realize the risk and consequently subject the project to serious problems.

Document Risks

As described earlier, assessment and documentation of risks are very important. Potential risks can then be mitigated in several ways such as:

- Add time to those tasks where resources are known to be a problem.
- Add time to the schedule if staff are not familiar with new technology being used.
- Where a skill shortage is identified, add time and resources for staff acquisition and training. By recognizing resource shortfalls and providing necessary training, a project manager mitigates some level of risk.

Review Schedule and Resources Continually

Despite a project manager's best efforts, project schedules and resource allocations have to be reviewed and adjusted continually as the project progresses and circumstances change. Early detection of problems will hopefully allow timely resource or schedule changes without affecting the overall project schedule and cost. If a change in the master schedule or the overall project cost is required, this must be processed using a formal change control with appropriate management and stakeholder approvals.

Procurement Planning and Solicitation

Procurement Planning & Solici- tation Overview

Most large IT projects involve major purchases of hardware, software and professional services. These can be purchased independently from different vendors or combined in a single prime contract with a systems integration contractor. This chapter focuses on the issues involved in planning, solicitation, and source selection for major procurements such as systems development and systems integration projects.

This chapter has three major components:

1. Procurement planning involves all procurement activities up to, but excluding, the preparation of a Request for Proposal (RFP).
2. Procurement Solicitation encompasses the preparation and distribution of the RFP and associated activities such as the proposers' conference.
3. Source selection involves the activities of proposal evaluation and selection of the winning vendor(s).

Contract negotiation, contract management and contract closeout will be covered in the Procurement Administration chapter.

Procurement Planning

Procurement planning should answer the following major questions:

- What should be purchased?
- What is available in the market now or is expected to be available in the required timeframe?
- What are the appropriate requirements for the purchased item?
- What is the right timeframe and procurement strategy for this purchase?
- What is the appropriate solicitation procedure?
- Who are the most viable potential vendors and what are the key source selection criteria?
- What is the total cost, not just price, of the purchase?

The following sections of this chapter are organized around these issues.

Defining the Scope of the Purchase

Identification of the items to be purchased should be accomplished in the early stages of the project. Ideally, items to be purchased for the project, including services, should be clearly separated from other items when developing the work breakdown structure. When it is a feasible option to complete a job by City staff, a make-or-buy analysis should be conducted to make the final decision. In general, the purchased items should be broken down to the smallest possible components. Smaller purchases will give the buyer greater flexibility to receive competitive bids and make the purchases more manageable. However, for some projects it may be better to hire a single prime contractor to provide and integrate all the required hardware, software, documentation, training and other services.

Procurement Planning and Solicitation

Understanding Market Conditions

The scope of the purchase should be defined as clearly and with as much detail as possible. This does not, however, exclude the possibility that the scope of the purchase may need to be revisited and modified later. The scope decision is critical because it directly affects the procurement cost, the project schedule and the system's performance. The project manager should always keep in mind that scope, cost and schedule are usually positively correlated in purchasing as well as in the rest of the project. When scope is defined too widely, additional purchase costs may be incurred and the project schedule may be extended. On the other hand, a too narrow scope may result in solutions that are not scaleable or sustainable to meet future requirements.

If the scope of the purchase includes the use of independent contractors, concurrence by the Personnel Department or approval by the City Council that "the work can be performed more economically or feasibly by independent contractors than by City employees" is required (per the City of Los Angeles Charter, Article X, Section 1022).

As part of procurement planning, the project team and other people involved in the purchasing decision should have a good understanding of the market conditions for the item to be purchased. In particular, the following information should be collected with regard to the item:

- Technologies available.
- Technology and pricing trends .
- Major vendors, including their specialties, availability of service, capacity, current workload, and their competitive positions in the industry.
- Prices and other costs such as transportation, costs of services, upgrades, etc.
- Industry standards, if available, compatibility with other products, etc.

There are many sources of information on market conditions including published articles, consultant research reports and the vendors themselves. For example, the Gartner Group continually updates their evaluation of technology solutions and vendors.

Reviewing existing City contracts is an important source of information. Amending an existing City contract may save considerable time and money over starting a whole new vendor solicitation and selection process. Adding items or amending the funding or the terms and conditions of an existing contract does require the approval of the City Attorney. Also, it may be cost-effective to purchase some hardware and software products off contracts from other government agencies such as the State of California.

Procurement Planning and Solicitation

Determining User Requirements and Developing Specifications

Involving the potential vendors early in the project can significantly shorten the procurement process and avoid costly mistakes. Early supplier involvement can provide valuable information on the latest technologies and market conditions. It also helps the potential vendors understand the nature of the project so they will be better prepared when they submit proposals. It is mandatory that vendor involvement be done in an equitable manner so that no vendor has an unfair advantage in the proposal process. This can be accomplished by issuing a Request for Information (RFI) to obtain information from all interested vendors on their potential approaches and capabilities to address the project objectives and describe solutions that have been implemented successfully and others that have created problems. The RFI does not require that the vendor submit firm prices, but may ask for budgetary estimates. Another tool is the Request for Qualifications (RFQ) which requests the vendor to provide qualifications and rates to perform desired classes of work, but not a fixed price to provide specific deliverables. It should be made clear to the potential vendors that early consultation is not a commitment and they will still be evaluated under the same criteria in the competitive proposal process.

Understanding the true needs of the users and the requirements derived from those needs is the key to effective procurement. User requirements should be documented and prioritized. In developing the requirements, a clear distinction should be made between what is essential for conducting business and what is just an enhancement that would increase cost without significant performance improvements. There are usually more requirements than a project can meet especially when the budget constraint is tight. The project manager's responsibility is to determine which requirements are "need-to-have" and what requirements are "nice-to-have". When cost is a major consideration, the nice-to-have requirements should be dropped. The project manager should not include a requirement without justification simply because the technology is available. It should also be noted that when defining user requirements, future needs in the anticipated life cycle of the system should be considered.

In developing requirements and specifications, hard choices have to be made because of the funding constraints. Redesigning the work processes may reduce the requirements of the procurement. Value analysis is also a useful tool to eliminate unnecessary features and components and, therefore, simplify the final design of the system. Both will lead to a reduced final procurement cost.

When developing specifications, adopted City standards should be considered first. Specifications that are inconsistent with the existing standards should be used only when there are overwhelming reasons and should be subject to approval by the appropriate authorities. Within the guidelines of the City standards, specifications should be made to maximize competition. For instance, in purchasing a computer, "compatible" means that it works with certain architecture, while "equivalent" implies the same features and quality as well as compatibility.

Procurement Planning and Solicitation

As a general guideline, company names and brand names should be avoided in specifications.

Many IT projects have to choose between a custom-developed system, such as a COBOL/CICS/DB2 or Power Builder application, and a commercial off-the-shelf system, such as a PeopleSoft application. If possible, this issue should be kept open in the Request for Proposal. Keeping both options open can attract more potential vendors and will give the City an opportunity to evaluate additional alternatives presented in the proposals.

The advantages and disadvantages of both options should be carefully reviewed. A custom-developed application can meet the unique needs of the City, although the initial cost may be higher. If a custom-made application is to be used, however, the following concerns must be addressed:

- Delivery schedule and its impact on the overall schedule of the project.
- Comprehensive documentation of the system.
- Support and training, both short-term and long-term.
- Ability to accommodate future needs.
- Right to revise the program when needed.
- Additional resources needed from the City.

If a commercial application is available, it typically has better documentation and support than a custom-made system. If a commercial application is to be used, however, the following concerns must be addressed:

- Ability to satisfy the City's unique requirements.
- Compatibility with City infrastructure and existing systems.
- Impact of customization on maintenance and upgrades.
- Additional cost of the unnecessary components built in the application.

An important consideration in any hardware procurement is the required useful life of the hardware, which depends on several factors including:

- The application and the workload growth estimate.
- The upgradability of the hardware to keep up with technology changes and application growth.
- City policies for economic life and replacement of computing and telecommunications hardware.

Total cost of ownership, or all-in-cost, refers to the total acquisition and lifetime usage costs of the system. In procurement, price is only one component of the total cost of ownership. Costs other than the price can be a large part of the all-in-cost. These include shipping, installation, customization, training and support, warranty services, debugging and upgrades, etc. For instance, inadequate training and support by a vendor can significantly increase learning time of the City staff. This extra learning time can be translated into significant costs in monetary terms as well as the opportunity costs of delaying the project.

Total Cost of Ownership

Procurement Planning and Solicitation

Types of Contracts

Fixed Price

When analyzing the cost of a proposal, the project manager should check that the proposal includes all items in the RFP. Sometimes, determining what is not included in the proposal is as important as what is included.

The City is a large institutional buyer. The project manager should check the availability of all possible discounts, such as volume discounts and cash discounts.

Fixed price contracts are usually good for purchases with low uncertainty and risk. Most IT projects, however, require procurement of very expensive and complex systems with many unknowns at the start of the contract. When firm fixed price is used, the vendor takes all the risk and will want to be compensated for taking this risk. The result is a proposal based on cost estimates with large built-in contingencies, such as cost estimates based on 90% probability. To deal with a high level of uncertainty and risk, the project manager may want to consider the following alternative types of contracts that are used by some private companies and government agencies to share risk between the City and the vendor.

Cost Plus Incentive Fee

A cost plus incentive fee contract will establish a target cost and an arrangement to share the cost overruns or savings. The final cost will be the target price minus the City's share of saving or plus the City's share of cost overrun. The target cost is the most likely cost estimated based on "normal" business conditions. The target cost should be set at a point where both parties agree that there is an equal chance of going above or below the target. The sharing arrangement typically specifies who is responsible for what percentage of the cost overrun or savings. In order to control the risk to the City, a ceiling price should be set based on pessimistic cost estimates. In addition, a minimum price may be set as the guaranteed compensation for the vendor.

Fixed Price plus Incentive Fee

Schedule Incentive - A schedule-based incentive fee that encourages the vendor to complete the project in a timely fashion.

Revenue/savings incentive - A share of savings or increased revenue generated by the project that aligns the vendor's goals and success more closely with the City's goals.

Cost Sharing

This is applicable if the system developed for the City can also be used by other clients of the vendor. Under such circumstances, the City and the vendor may be able to agree on what they consider a fair basis to share the costs.

Procurement Planning and Solicitation

Cost Plus Award Fee

The award fee is a pool of money established by the buyer to reward the vendor on a periodic basis. At the end of each period, the buyer will evaluate the vendor's effort in meeting the buyer's needs and release part of the award fee. The evaluation is typically subjective and effort-based. This type of contract is most applicable for the projects that require substantial effort in development. For these projects, the City will benefit if it has the ability to reward the vendor for non-quantitative aspects of its performance on a subjective basis.

Multi-phased Procurements

A typical systems development and systems integration project encompasses several phases from definition of requirements through design, development and implementation. When a contract is negotiated early in the above process, for example, before detailed requirements are known or before a software package fit analysis has been performed, there is a significant risk that the scope of the project will increase as the details become visible. The Project Manager should ensure that the Project Funding Proposal includes contingency funds of at least 20% over and above the initial contract price to cover Change Requests arising during requirements definition or fit analysis. At the end of the requirements phase the project cost estimates should be reviewed to ensure that the appropriated funds are still adequate to complete the project.

At the end of the requirements phase it is sometimes difficult to determine whether a detailed requirement is a change in scope that justifies a contract change request or was implied in the original contract scope. Resolution of these issues requires good judgment and a good faith relationship with the vendor.

The Procurement Plan

The procurement plan is the major deliverable for procurement planning. This plan should include the answers to all major questions listed at the beginning of the chapter. In addition, this plan should also address contractual issues such as the proposed type of contract and the contract management strategy. **Figure 9.1** presents a list of the major sections and a brief description of the major items that may be included in each of the sections. This is a general format. Obviously, some purchases may have issues that are not represented here, and some of the items listed here may not apply to all purchases.

Procurement Planning and Solicitation

Figure 9.1 - Major Sections of the Procurement Plan

Executive Summary

Description of the Items and Services to be Purchased

- The intended use of the items
- The performance requirements to be met by the items
- The benefits and/or justification of the purchase

Market Analysis

- General market conditions
- Technological trends
- Available products
- Similar systems in use and performance
- Detailed sources of information on the item

Requirements Analysis

- Process requirements ensuring that the system will meet the requirements of the work process
- Technical requirements ensuring that the system will have the capabilities and the capacity required, and will fit into the City's technical infrastructure and operating environment
- Project management requirements including definition of vendor and City responsibilities
- Specifications including the technical data required in specifying and inspecting the selected product

Procurement Planning and Solicitation

Sourcing

- Sources from which the item can be obtained
- Financial conditions, technical capability, and capacity utilization of the major potential vendors
- Factors affecting the supply, demand, price, and inventory of the selected product
- Types of contracts/ordering agreements
- The Selection Process and Criteria
- Negotiation strategies

Deliverables and the Procurement Schedule

- A list of all major deliverables
- A description of and timeline for the procurement process, including all required approvals

Procurement Planning and Solicitation

Procurement Solicitation

The competitive procurement process is usually long and complex. This section provides an overview of the entire process. There are two kinds of procurements that are characterized as bids and proposals. A Request for Bid is utilized when purchasing a well-defined product with detailed specifications, where the winning bidder is determined primarily on cost, subject to compliance with all legal and administrative requirements. The Request for Proposal (RFP) is used where the vendor is asked to provide a solution to a problem including, in the case of IT projects, hardware, software and a variety of professional services. The winning proposal is selected based on a number of evaluation criteria, including cost, as discussed later in this chapter. The final selection is based on a tradeoff between value, i.e., what the vendor will deliver, cost, and confidence level that the vendor can deliver as proposed. The remainder of this chapter focuses on RFPs and proposals, including the development of the RFP and the evaluation of proposals and selection of the vendors. The following is a checklist of the major steps in a typical competitive proposal process:

Steps in the Proposal Process

1. RFP Preparation

- Obtain authority to prepare and release an RFP for this project. This may have been accomplished automatically as part of the budget approval process, or may require special authorization, such as, under Article X Sec. 1022 of the City of LA City Charter.
- Define objectives and tasks for the contract based on the Work Breakdown Structure (WBS).
- Specify deliverables and the functional and technical requirements.
- Set administrative requirements such as due dates for deliverables, payment schedules and terms, etc.
- Establish the evaluation process and criteria for vendor selection.
- Draft the RFP.
- Notify the CAO of the intent to issue the RFP.
- Obtain approval of the RFP from the project Executive Sponsor, the project Executive Steering Committee and, if applicable, the City Council. All RFPs for long-term contracts, defined as 3 or more years, require Council approval, as do RFPs for grant-funded projects. It is recommended that RFPs be reviewed by the City Attorney's Office to ensure they do not contain or miss information that could result in an unplanned legal liability.

Procurement Planning and Solicitation

2. Proposal Collection

- Distribute the RFP to known potential vendors, and advertise it so that all interested vendors can submit proposals. Request interested vendors to notify the City of their interest so they can be included on the distribution list for any follow-up documentation.
- Collect written questions from potential vendors for the proposers' conference.
- Prepare answers to the questions.
- Hold the proposers' conference. A proposers' conference is mandatory only if the RFP requires the use of subcontractors and therefore a good faith outreach effort to qualified MBE/WBE/OBE businesses. However, even when it is not mandatory, a proposers' conference is desirable to ensure that proposers have the best possible understanding of all the RFP functional, technical and administrative requirements. Invite staff from the Office of Contract Compliance to make a presentation and answer vendor questions related to the City's administrative requirements such as MBE/WBE/OBE and Affirmative Action, and from the CAO on the City's Living Wage and Service Worker Retention ordinances.
- Document the questions and the answers and publish both on the City's Website.
- Issue RFP addendum, if applicable.
- Receive proposals from the proposers.

3. Proposal Evaluation and Vendor Selection

- Review the proposals and screen the proposers.
- Develop the "short list" of the proposers.
- Conduct site visit(s), if applicable.
- Invite the finalists to present their proposals.
- Select the winner(s)
- Negotiate and award the contract(s).

Request for Proposal (RFP)

Most projects will require at least part of the work to be contracted to outside vendors. As a government institution, competitive procurement is the most common approach used by the City in the vendor selection process. The Request for Proposal (RFP) is a formal document for soliciting proposals from potential vendors. It outlines the objectives of the project and the work that needs to be accomplished to achieve the objectives. It also specifies the functional and technical requirements and describes the **evaluation criteria**. The following sections will discuss the format of the RFP and the most important component of RFP, the Statement of Work.

Procurement Planning and Solicitation

RFP Format Overview

The RFP should include the following major sections:

1. An Introduction that describes the objective and the nature of the project, the City's intent in issuing the RFP, and a brief summary of what is being requested from the vendor;
2. The Statement of Work, which contains two parts:
 - The functional and technical requirements of the product or system to be delivered;
 - The work and the deliverables that the contractor is expected to provide;
3. Key contract terms and conditions;
4. Instructions for the content and format of the proposal and how to submit it;
5. The City's standard provisions for an RFP.

Detailed discussion on the Statement of Work is presented below, followed by an example of a table of contents for a major system development and system integration RFP.

Statement of Work

Writing the Statement Of Work (SOW) is a process of developing and documenting the requirement of the purchase. The SOW defines what the vendor is to accomplish. The clarity, accuracy, and completeness of the SOW determine, to a large extent, whether the objectives of the purchase will be achieved.

The preparation of the SOW should include the following aspects:

Objectives

The SOW should clearly identify the objectives of the project. It is important that the project manager has a good understanding of the background of these objectives and obtains related information such as from where the objectives came, who originated them, and why they were originated. The SOW should prioritize the objectives as primary and subordinate objectives so that both the vendor and the City staff know where to place their emphasis

Work Requirements

The project manager should carefully review all requirements submitted. To keep procurement costs in control, the project manager should challenge the tasks and their interrelationships. Value analysis techniques may be applied to complex tasks and service requirements. All deliverables must be clearly identified. The SOW should specify the points in time, the type, and, if applicable, any quantifiable measures of the deliverables.

Current Status and Future Risks

The current status of the project directly affects the procurement schedule and provides useful information on the future risks of the purchase. Information on funding approval, the status of the related tasks, and commitments from the major stakeholders are important inputs for developing an appropriate procurement schedule.

Procurement Planning and Solicitation

**Operational
Environment and
Constraints**

The environment in which the purchased item will operate determines in many ways what the vendor has to do to achieve the objectives of the project. The factors that need careful examination include the operational conditions of the environment, facilities available versus required, network infrastructure, geographical locations, etc. The project manager should identify the resource, schedule, and compensation constraints for the purchase and ensure that the requirements described in the SOW are consistent with the identified constraints.

Responsibilities

The SOW should identify all vendor and City participation needed for the project. The SOW defines what the vendor does and what the City receives. On the other hand, the SOW should also describe the tasks that the City will perform and the City-furnished resources, such as equipment, facilities, materials, phones, parking, etc. In information system procurement, the areas of responsibility that need to be defined may include:

- Hardware including servers, workstations, etc.
- Software
- Network infrastructure
- Standards compliance
- Training and knowledge transfer
- Data collection and storage
- Information security, privacy and confidentiality
- Integration
- Conversion
- Testing
- Documentation
- Implementation
- Project management

Procurement Planning and Solicitation

Contents of the Statement of Work

Although the general format may vary from project to project, the SOW should address the following major topics:

- **Background** - What is the background of this project, especially the information related to this purchase?
- **Project Requirements** - What are the general requirements for this project?
- **Contract Requirements** - What are the specific work requirements (tasks) for this purchase?
- **Vendor Responsibilities and City Support** - What are the responsibilities of the vendor? What are the responsibilities of the City?
- **Form of the Contract** - Is this a prime contract? To what extent is the vendor required to or allowed to subcontract? Will there be multiple prime contractors?
- **Timeline** - What are the schedule requirements for this purchase? This may be combined with Contract Requirements.
- **Summary of Deliverables** - What are the major deliverables for this purchase? This may also be combined with Vendor Responsibilities.

RFP Table of Contents Example

Figure 9.2 presents an example of the RFP format for a large IT systems development and systems integration contract. It should be noted, however, that this sample RFP is only a starting point. The City has a set of standard provisions for all RFPs that is changed periodically. The responsibility for these standard provisions rests with several departments and bureaus, including General Services Department-Purchasing, Board of Public Works Contract Administration and the City Attorney's Office. Also, each department may have its own recommended RFP format. The project manager should check with the responsible authority in the department for the latest changes in RFP requirements and the City standard RFP provisions.

Procurement Planning and Solicitation

Figure 9.2 - An Example of RFP Format

Cover Page

The cover page should describe briefly the scope of services requested, the format and deadline for submission of proposals, and the City contact for further information about the RFP. If a proposer's conference is appropriate, include information on the location, time and date of the event.

Contents

Although the format may vary from one project to another, the items included in an RFP are similar. The following is the Table of Contents for the City Clerk's Tax and Permit System (TAPS2000) RFP:

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 - 1.2. General Overview and Background
 - 1.3. Project Organization
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 - 2.2. Timeline for Implementation
 - 2.3. Summary of Deliverables
3. ORGANIZATIONS INVOLVED
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 - 3.2. Information Technology Agency (ITA)
 - 3.3. Other Departments
4. TAPS2000 REQUIREMENTS
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 - 4.2. System Requirements
 - 4.2.1. Access
 - 4.2.2. Security
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- 4.4.3. Data Management
- 4.4.4. Technical Environment, Standards and Guidelines
- 4.4.5. L.A. City Network Environment
- 4.5. Training Requirements
- 4.6. Future Capabilities of the System
 - 4.6.1. Future Capability I – Document Imaging/Scanning
 - 4.6.2. Future Capability II – Electronic Commerce and Public Access
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- 5. PROPOSAL FORMAT AND CONTENTS
 - 5.1. Letter of Transmittal
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 - 5.7. Project Personnel
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 - 5.10. Costs
 - 5.11. System Design Concept
 - 5.12. System Design and Development Process
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- 6.17. Packaging of Proposal
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APPENDICES

Appendix 1 -	Functional Requirements
Appendix 2 -	Number of Users by Site
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Appendix 11 -	Child Care Policy
Appendix 12 -	Declaration of Compliance Service Contract Worker Retention Ordinance and the Living Wage Ordinance
Appendix 13 -	Project Organization

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Source Selection

The formal source selection process described here starts immediately after the deadline for receipt of responses to the City's RFP. All responses received after the deadline cannot legally be included in the evaluation process.

The basic steps in the vendor evaluation process are described below. The first two steps are preparatory and are started earlier during the RFP preparation process.

1. Establish the evaluation team. In most cases this is the same team that prepared and reviewed the RFP. The team should include business functional experts, technical experts and people with experience implementing similar projects. Sometimes an outside independent consultant is necessary to supplement the experience of the City team.
2. Establish consensus on the evaluation process and the evaluation criteria. The general evaluation criteria should have been included in the RFP, but without details on proposal scoring. In this step the evaluation process is laid out in full detail. The elements to be evaluated are:
 - Quality and responsiveness of the proposal
 - Vendor qualifications and past performance
 - Confidence in proposal schedule and/or cost estimates
 - Compliance with the City's administrative ordinances, i.e., MBE/WBE, Living Wage, and the City's standard contract provisions
 - Cost
3. Eliminate those proposals that are clearly non-responsive. Non-responsive means that the proposer did not follow the directions in the RFP related to content or format and/or did not submit all the required information, both technical and administrative. The quality of the proposal is not addressed in this preliminary screening, only the existence or lack of required inputs, and consistency or inconsistency with the proposal format defined in the RFP.
4. The viable proposals from (3) above should be evaluated in detail by the team. The Project Manager should delegate the different aspects of the evaluation to individual experts or sub-teams with the required knowledge and experience. These individuals or sub-teams should provide written evaluations in their fields of expertise. The results of this evaluation should be documented in the form of a table with scores as described in Figure 9.3 below, and written explanations supporting the scores, including the strengths and weaknesses of each proposal and vendor.
5. Concurrently with (4) above the viable proposals should be submitted to the City Office of Contract Compliance for adherence to the City's administrative ordinances such as, MBE/WBE and Affirmative Action, and to the CAO for Living Wage and Equal Benefits. The Office of Contract Compliance and CAO will provide written pass or fail grades. Vendors with a fail grade will be eliminated from further consideration.

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Under certain conditions a vendor may be permitted to provide additional information, but only with the approval of the Office of Contract Compliance or CAO.

6. Create a short list (about 3) of the best vendors who will be asked to make presentations and perhaps to organize customer site visits. Meeting the key vendor team members who will actually perform on the project is very important in the selection process.
7. Organize vendor presentations, demonstrations and/or customer site visits with the short list of vendors.
8. Check references of the prime contractor, any proposed sub-contractors and the key vendor team members.
9. Update the vendor evaluation matrix and the support documents based on the presentations, site visits and references.
10. Review the evaluations and select the winning proposal based on best value and likelihood of success versus cost. Other factors that may influence the selection include the proposed payment terms, ownership of the resulting product, and potential risks.
11. Document the evaluation process and the results in a vendor selection report that will be presented to the appropriate authorities including, if applicable, the Mayor and Council for their approval.
12. Send letters to inform the vendors of the status of their individual proposals and whom to contact (usually the Project Manager) for more information.

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Vendor Evaluation Summary

Figure 9.3 is an example of a table summarizing the vendor evaluation and the vendor selection recommendation. The table must be supported by a written explanation describing the rationale for the final recommendation. Following the table is a detailed discussion of the proposal scoring criteria, and of each of the evaluation factors.

Figure 9.3 - VENDOR EVALUATION SUMMARY

EVALUATION FACTOR	FIRM A	FIRM B	FIRM C	FIRM D
Proposal Responsiveness and Quality	9	8	7	7
Proposer Qualifications and Past Performance	10	8	9	5
Confidence in schedule and/or cost estimates	9	7	9	NA
Overall Score	9.5	7	8	NA
Compliance with City Ordinances	PASS	PASS	PASS	PASS
Total Cost for X fiscal years	\$30MM	\$25MM	\$20MM	No Cost analysis when Qualifications are marginal
FINAL RECOMMENDATION (RANK)	1	3	2	NA

Proposal Scoring Criteria

It should be recognized that evaluation of proposals is a judgmental process. However, it is helpful to try to quantify the judgment in the form of scores. Care must be exercised in the use of such scores, and in particular, any mathematical manipulation thereof.

A suggested guideline for assigning scores to each factor is to establish four grades and to assign a score in the range for each grade as shown below. The range for each grade is provided in order to permit differentiation among proposals with the same grade.

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GRADE SCORE

Outstanding	9-10
Acceptable/good	6-8
Marginal	3-5
Unacceptable	0-2

The grades can be applied to the scoring of each of the evaluation factors and to the overall score. Following are some typical terms that describe the above grades.

Outstanding – satisfies all requirements, innovative, practical and effective solutions, clear and complete description of inter-relationships, fully responsive, clear and comprehensive understanding of the requirements, demonstrated superior experience and skills.

Acceptable – satisfies most requirements including all critical requirements, feasible solutions, generally clear and complete description of inter-relationships, responsive, good understanding of the requirements, demonstrated good experience and skills.

Marginal – satisfies most requirements but not all critical requirements, apparently feasible but somewhat unclear solutions, weak description of inter-relationships in some areas, partially responsive, fair understanding of the requirements, staff lacks experience and skills in some areas.

Unacceptable – does not satisfy many critical requirements, infeasible and/or ineffective solutions, unclear, incomplete, non-responsive, lack of understanding of the requirements, lack of demonstrated experience and skills.

The above definitions may require customization for each proposal and for each evaluation factor. Vendors with acceptable scores on all evaluation factors are viable candidates for the short list of vendors to make presentations or arrange site visits. Vendors with marginal or unacceptable scores should be eliminated early in the evaluation process. Efforts to differentiate between marginal and unacceptable proposals should be minimized. The real challenge is to understand the strengths and weaknesses of the best proposals.

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Overall Score

There are several alternative ways of developing the Overall Score.

- **Average** - Calculate the average of the three scores which, in the above example, would be 9.3 for Firm A, 7.7 for Firm B and 8.3 for Firm C. This method implies equal importance or weighting of the individual evaluation criteria.
- **Weighted Average** – In most cases the evaluation criteria are not equally important. In this case, an alternative method is to calculate a weighted average of the three scores. If Proposal quality has a weight of 20%, vendor qualifications has a weight of 30% and confidence factor has a weight of 50% (the weights must add up to 100%), the weighted average score would be 9.3 for Firm A, 7.5 for Firm B and 8.6 for Firm C. The most difficult part of this approach is the establishment of weighting factors ahead of time. The weighting logic should be documented.
- **Consensus** – The third alternative is to have each team member provide an overall score based on the individual's experience and priorities. Then develop a team consensus. This method was assumed in the above example. A separate table documenting the overall score by firm by rater (anonymous) can be provided as an option to display the level of consensus.

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Proposal Responsiveness and Quality

Figure 9.4 is a table that summarizes the evaluation of proposal responsiveness and quality in terms of:

- Proposed application solution;
- Proposed technical solution;
- The management approach & project plan.

The scores in this table are based on the same 10 (Outstanding) to 0 (Unacceptable) scale described previously. The overall responsiveness and quality score in figure 9.4 should be transferred to the first row of figure 9.3.

An approach to deriving the scores for each row of Figure 9.4 is described in the following sections of this chapter.

Figure 9.4 – Proposal Responsiveness and Quality Summary

	Vendor A Score	Vendor B Score	Vendor C Score	Vendor D Score
Application Solution – User functional view	9	9	7	7
Technical Solution – Technical view	9	8	7	8
Management Approach & Project Plan	8	7	9	7
Overall Proposal Responsiveness and Quality (transfer to Figure 9.3)	9	8	7	7

Evaluating the Application Solution

The application solution should be viewed from a user and business viewpoint. The technical solution is a separate evaluation.

Typical questions in evaluating the application solution are:

- Does the vendor's proposal demonstrate that it meets the functional and performance requirements listed in the RFP?
- Does the vendor demonstrate a good understanding of the requirements?
- Are there significant gaps in the proposal?
- Has the vendor proposed alternative solutions that require some changes and perhaps compromises in the requirements?

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It may be helpful to set up a checklist of functional and performance requirements and assign a priority for each as shown in **Figure 9.5**. It is recommended that you do **NOT** assign numerical scores and weights to each requirement at this stage. A checklist as shown in Figure 9.5 can provide a clear summary of what a proposal covers and is usually more reliable than a numerical scoring system.

Figure 9.5 - Functional and Performance Requirements Checklist

Functional and Performance Requirement	Priority	Requirement Satisfied
Function #1	Critical	Yes
Function #2	Important	Yes
Function #3	Nice to have	No
Function #4	Important	No
Performance/capacity requirement A	Important	Partially
Performance/capacity requirement B	Critical	Yes
Etc.		

The second aspect of the evaluation of the vendor's application solution is evaluating the proposed design from a user and business process standpoint. Different design solutions may have different impacts on people, their interfaces with each other and on their jobs. Some solutions may be much easier to implement in the organization than others. Figure 9.6 is an example of scoring criteria for evaluating the application solution. The overall score can be transferred to the appropriate row and column in Figure 9.4.

Figure 9.6 - A Scoring System for Evaluation of Application Solution

APPLICATION SOLUTION EVALUATION FACTOR	Vendor A Score	Vendor B Score	Vendor C Score
1. Demonstrated understanding of the application objectives and requirements			
2. Responsiveness to the functional and performance requirements of the RFP (based on checklist such as figure 9.5)			
3. Completeness, clarity and innovation of the proposed application solution and how it meets the requirements			
4. Completeness and clarity of the inter-relationships among the components			
5. Feasibility and practicality of the proposed application solution			
6. Ease of implementation in the City environment and culture			
7. OVERALL (transfer to Figure 9.4)			

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Evaluating the Technical Solution

The factors to be considered in the technical evaluation include:

- Responsiveness to the technical requirements in the RFP;
- Completeness and clarity of the proposed technical solution;
- Compatibility with existing or proposed City platforms and standards;
- Degree of compliance with open standards to limit dependence on a single hardware/software vendor;
- Knowledge and understanding of the proposed technologies by City staff;
- Adequate description and acceptability of the technical standards, including documentation standards, that will be used in the systems development and implementation process;
- Scalability and long-term viability;
- Thoroughness of the analysis or benchmarking studies to demonstrate that the proposed hardware/software configuration will meet the City's performance and reliability requirements;
- Technical complexity which may impact implementation risk and also production reliability;
- Technical risk, that is, whether the proposed technical approach is well proven and can be seen in operation, or whether the proposed approach utilizes new, state-of-the-art, technologies (The best solution may not be either extreme).

Figure 9.7 is an example of a checklist that can be used to determine the completeness of the responses to the technical requirements of the RFP. The list is not intended to be exhaustive, only to stimulate thought. The technical requirements should be tailored to the specific requirements of the RFP. Performance requirements that were included in the evaluation of the applications solution may translate into technical requirements in Figure 9.6. For example, transaction volume and response requirements may translate into a technical requirement for network bandwidth.

Figure 9.7 - Checklist for Technical Requirements

Technical Requirement	Priority	Requirement Satisfied
Technical performance parameters	Critical	Yes
Storage capacity	Important	Yes
Systems management	Nice to have	No
Data management	Important	No
Reliability, redundancy, failure modes	Important	Partially
Backup and recovery	Critical	Yes
Data conversion	Critical	Very thorough
System and data interfaces	Important	Unclear
Maintainability	Critical	Partially
User help capabilities	Important	Skimpy
Etc.	Nice to have	Partially

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The assessment of how well the proposal addresses and meets the technical requirements is used to determine the score in Figure 9.8.

Figure 9.8 - A Scoring System for Evaluation of Technical Solutions

TECHNICAL EVALUATION FACTOR	Vendor A Score	Vendor B Score	Vendor C Score
1. Responsiveness to the technical requirements of the RFP			
2. Completeness and clarity of the proposed technical solution			
3. Compatibility with existing or planned City platforms and standards			
4. Compliance with open standards			
5. Knowledge and understanding of proposed technologies by City staff			
6. Long-term viability and scalability			
7. Availability of benchmarking studies to validate capacity & performance			
8. Technical risk including technical complexity and maturity			
9. OVERALL (transfer to Figure 9.4)			

Evaluating the Management Approach and Project Plan

The Overall technical score should be developed using judgment considering the relative importance of the evaluation factors. Identifying and documenting the significant differences between the proposals is very important. The overall score should be transferred to the appropriate row and column in Figure 9.4

While the application solution and technical solution address the evaluation of the proposed product that will be delivered, this evaluation category addresses how the vendor proposes to go about delivering the product. There are two major aspects of this evaluation:

1. The completeness, clarity and credibility of the project plan. The keys to this are:
 - A WBS at the appropriate level of detail for the stage of the project;
 - A clear definition of project deliverables, including outlines of deliverable documents;
 - A clear definition of vendor versus City responsibilities;
 - A detailed description of the vendor's planned resource commitment to the project;

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- A clear statement of all critical assumptions being made by the vendor, including, but not limited to, availability of City staff and other resources, the approval process for deliverables, the issue resolution process, any critical management or legislative actions or decisions;
- A clear statement of major issues that the vendor believes need to be resolved;
- A realistic project schedule with major dependencies identified and with a practical staffing plan;
- Some validation of the proposed schedule and resource requirements based on the vendor's experience on similar projects or other external sources of information;
- An assessment of project risk.

2. The vendor's approach and process to manage:

- Scope;
- Schedule;
- Cost;
- Quality (development standards, technical reviews, user reviews, quality assurance, etc.);
- Risk (technical, staffing, schedule, etc);
- Project communication within the team and with stakeholders;
- Business process changes.

All of the above items should be addressed in more detail during contract negotiations. However, the extent to which they are or are not addressed adequately in the vendor's proposal impacts the credibility of the vendor to manage a successful project. Figure 9.9 can be used as a checklist or as a sample scoring system to evaluate some of the issues listed above.

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Figure 9.9 - A Scoring System for Management Approach and Project Plan

MANAGEMENT EVALUATION FACTOR	Vendor A Score	Vendor B Score	Vendor C Score
1. Completeness and clarity of the scope of work in a WBS with work package descriptions and completion criteria			
2. Completeness and clarity of the description and acceptance criteria for project deliverables			
3. Acceptability of the proposed implementation strategy			
4. Completeness and clarity of critical assumptions, particularly relating to City responsibilities, City resources and City decision and approval processes			
5. Completeness and practicality of the master schedule and staff loading			
6. Completeness and acceptability of the vendor's development and documentation standards			
7. Completeness and acceptability of project management strategies and processes for managing scope, quality, schedule and cost			
8. Assessment of major project risks and plans for monitoring and mitigating them			
9. Acceptability of proposed software ownership, warranty and maintenance arrangements			
10. OVERALL (transfer to Figure 9.4)			

Evaluating Proposer Qualifications and Past Performance

Vendor qualifications should be evaluated based on the capabilities and experience documented in the proposal and on client reference checks. For the top 1-3 vendors this may involve site visits, preferably without the vendor's presence.

The vendor (prime and sub-contractor) capabilities should be evaluated as a company, and the capabilities and experience of the key team members should be evaluated as individuals. At the company level the evaluation factors include:

- Demonstrated experience on similar projects in government agencies and in industry;
- Demonstrated knowledge and experience with the proposed technologies;
- Availability of staffing talent to supplement the proposed team in case of problems
- Performance, both technical and project management, on other projects in the City of LA or at other clients;
- Financial viability to handle the financial risks of schedule and cost overruns, should they occur;

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- A culture that is compatible with the City. A vendor should not be selected before the evaluation team has met with the proposed project manager and key team leaders, and is comfortable that a compatible working relationship can be established.

The same criteria, with the exception of financial viability, apply to the key individual team members.

The ratings can be documented in a table as shown below in Figure 9.10

Figure 9.10 - A Scoring System for Vendor Qualifications and Past Performance

Evaluation Factor	Prime Contractor Capabilities	Subcontractor Capabilities	Capabilities of Key Individuals	Overall Team Capabilities
1. Success in design, development, systems integration, implementation of large systems				
2. Experience in the business functions involved				
3. Success on projects of a similar scope or size with state or local government agencies				
4. Success on projects of a similar scope or size with commercial clients		One table for each vendor. Transfer score in bottom right corner to Figure 9.3.		
5. Past performance on contracts for the City of LA				
6. Experience with the proposed technologies				
7. Project management experience				
8. Ready availability of supplemental staff with special skills if/when needed				
9. Financial viability				Not applicable
10. Overall Vendor Qualifications & Past Performance				Transfer to Figure 9.3

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Confidence in Schedule and/or Cost Estimates

Establishing the level of confidence whether or not the vendor can perform according to the proposal is a critical factor in the evaluation process. It is also a measure of the risk of accepting the proposal and working with the vendor. A great proposal at a good price may have a high risk of over-runs or even failure if the time and cost estimates appear to be too aggressive. **The lower the confidence level in the estimates, the higher the required contingency in the funding plan.**

Confidence in schedule estimates and cost estimates tend to be highly correlated. It is unlikely that a low confidence in the proposed schedule is associated with a high confidence in the cost estimates. On some projects schedule is the more critical factor, and on others cost is as important or more important. The title of the confidence factor row should be tailored accordingly.

The level of confidence in the ability of the vendor to meet performance and cost targets is based on:

- The detailed backup information supporting the estimates in the proposal ;
- The risk analysis and risk mitigation strategies in the proposal;
- Past performance of the vendor on similar projects;
- Experience of other government agencies or businesses on similar projects gathered from published articles, personal contacts or consultant surveys;
- Judgment based on the prior experience of the evaluation team.

The confidence level should be documented in the form of a confidence score in Figure 9.3, the Vendor Evaluation Summary. The scores may be defined in a manner similar to the quality ratings:

Very high confidence	9-10
Good confidence	6-8
Marginal confidence	3-5
Unacceptable	0-2

Compliance with City Ordinances

Only vendors with a passing grade, as determined by the Office of Contract Compliance and CAO, need be shown on this table. A separate list of proposers who fail this criterion should be included in the final evaluation report.

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Cost Analysis

Cost analysis must put all proposals on an equal footing, so that you are comparing apples to apples. Therefore, cost analysis must look at total costs to the City over a meaningful lifecycle, not just the price for the development/implementation contract. Total costs include the cost of City staff and of any other resources supplied by the City. This is important because each vendor may make different assumptions about vendor versus City tasks in the proposed project plan. Lifecycle costs include hardware and software maintenance agreements and estimated maintenance and support costs by City staff or outside contractors for the next 3 to 5 or more years. The potential system life may be longer than 5 years, but the precision of cost estimates for more than 5 years in the future is questionable, and in most cases these far-out costs are unlikely to impact the current vendor selection.

Adjustments to the costs in the proposals may be necessary. For example, one vendor may propose a less expensive hardware configuration with less peak-load capacity or less redundancy to keep the system operational in the event of individual component failures. The evaluation team may need to adjust the cost of one of the proposals to equalize the configurations.

If there are significant differences in estimated costs, whether the initial implementation or lifecycle costs, it is important to understand the reasons for the differences.

The financial analysis can be presented for each vendor in a table as shown in Figure 9.11. The table shows cost by fiscal year for three or more fiscal years. The time period should depend on the size and nature of the project, recognizing that the longer the time period, the less precise the forecast. The Total Cost for X fiscal years in the bottom right-hand corner of the matrix should be transferred to the appropriate cell in Figure 9.3.

The cost analysis matrix may need to be customized for each proposal.

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Figure 9.11 - Cost Analysis

Vendor	Cost Element	Cost Fiscal Yr 1	Cost Fiscal Yr 2	Cost Fiscal Yr 3	Etc.	Total Cost for X Fiscal years
A	Development/Implementation -					
A	Vendor Contract					
A	City - Salaries & Related					
A	City - Other Expenses					
A	Development/Implementation Costs -Total					
A	Annual Operating Costs					
A	Vendor Contract					
A	City: - Salaries & related expenses					
A	City - Other expenses					
A	Annual Operating Costs - Total					
A	Total Cost					Transfer to Figure 9.3

The financial analysis of some proposals may be more complex if, for example:

- There are special financial arrangements where the vendor shares in the development cost and is reimbursed after implementation by a monthly fee or by a per transaction fee or by a share of the cost savings or increased revenues;
- Implementation strategies are significantly different and affect the achievement of desired savings or revenue increases;
- The vendor plans to market the product to other government agencies

In such cases it may be necessary to analyze annual net cash flow (cost – savings or revenue increases) to compare the proposals.

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Final Recommendation

The final ranking and recommendation is a tradeoff between overall score and cost. In the hypothetical example in Figure 9.3, which is reproduced in Figure 9.12 below, firm A's proposal was ranked #1 because the evaluation team has judged that the extra quality (meeting more requirements or a more innovative solution) of Firm A's proposal is worth the extra \$10MM and the funds are expected to be available. The recommendation should be justified by documenting the strengths and weaknesses of proposals and proposers, and relating them to the City's priorities.

Vendor Evaluation Report

A formal report documenting the results of the vendor selection process and the rationale behind the selection should be submitted to the Mayor's Office or other appropriate authority for approval. The CAO will prepare a report in the proper format for Council approval when required. The Vendor Evaluation Report may also be attached to a Project Funding Proposal as described in Chapter 11 if appropriation of funds and approval of the vendor selection process are to be done simultaneously. The Vendor Evaluation Report should contain the following:

1. Executive Summary and Recommendation;
2. A description of the purchase;
3. The Vendor Evaluation Summary Table as in Figure 9.12 below, which is a copy of Figure 9.3 that was described earlier in the chapter.
4. The table should be followed immediately by a written explanation describing the rationale for the final recommendation, including documentation of the key strengths and weaknesses of the proposals and the proposers.
5. The Cost Analysis (Figure 9.11)
6. A signature page with signatures of the evaluation team members.
7. Appendices containing:
 - A summary description of the procurement process including RFPs issued, vendors responding, etc.;
 - A summary description of the evaluation process including the composition of the evaluation team and the key evaluation criteria;
 - Summaries of the backup evaluation tables, such as, figures 9.4 to 9.10.
 - Any other important backup documents.
 - A table showing each proposer's pass or fail rating for administrative compliance.

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Figure 9.12 - VENDOR EVALUATION SUMMARY

EVALUATION FACTOR	FIRM A	FIRM B	FIRM C	FIRM D
Proposal Responsiveness and Quality	9	8	7	7
Proposer Qualifications and Past Performance	10	8	9	5
Confidence in schedule and/or cost estimates	9	7	9	NA
Overall Score	9.5	7	8	NA
Compliance with City Ordinances	PASS	PASS	PASS	PASS
Total Cost for X fiscal years	\$30MM	\$25MM	\$20MM	No Cost analysis when Qualifications are marginal
FINAL RECOMMENDATION (RANK)	1	3	2	NA

Project Funding Proposal

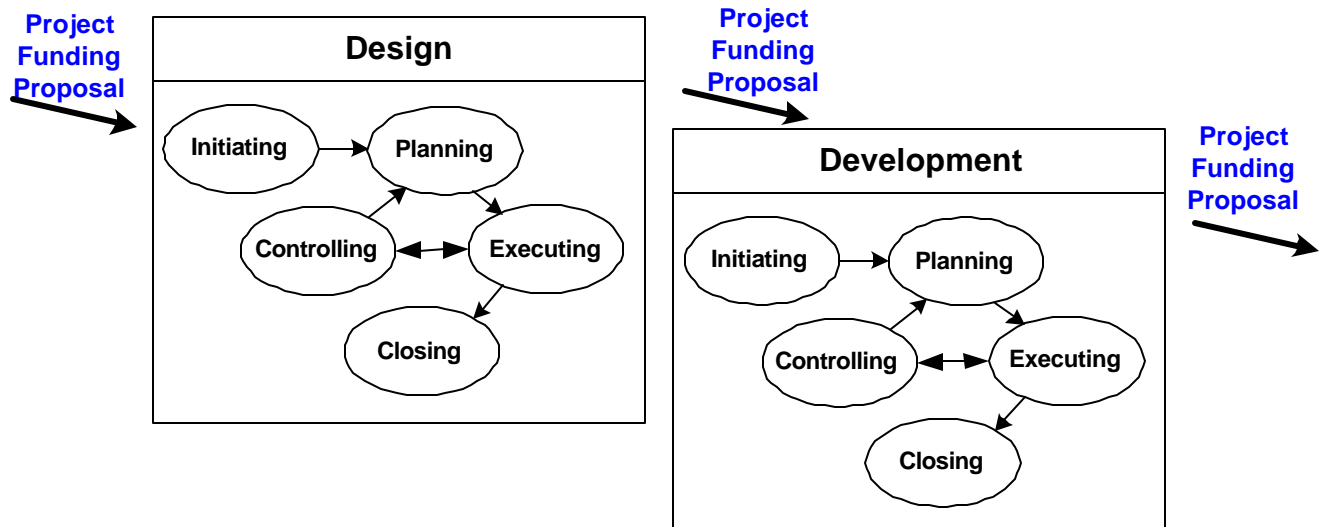
Overview of Project Funding Proposal

The Project Funding Proposal is the document that, when approved by the Mayor and City Council, becomes the budget for the project. The approval process for the Project Funding Proposal depends on when it is submitted to the Mayor's Office. It may be incorporated in the City's Annual Fiscal Budget process or the Mid-year Budget Adjustment, or may be processed independently as an Interim Budget Request.

The Cost Baseline described in Chapter 12, Cost Planning, breaks the Project Budget down into a detailed cost baseline by work package that is used, along with the schedule, for measurement of project progress and performance.

The Project Funding Proposal

The Project Funding Proposal is a management document. It is prepared at the beginning of a project or project phase, often as a deliverable of the previous project phase. It is the basis of the CAO report that goes to the Mayor and City Council for approval. The Project Funding Proposal may request appropriation of funds for a single project phase, or for a whole project. Even if the Mayor and Council have approved and funded multiple phases at one time, the project proposal should be updated at the end of each phase and submitted to the Project Executive Steering Committee for their approval. The Executive Steering Committee may in turn update the Mayor and Council.



Project Funding Proposal

The Project Funding Proposal defines the project objectives, scope, deliverables, constraints, and business justification. It includes a high level plan with a master schedule for major project deliverables and estimates of resource requirements and costs. The Project Funding Proposal often includes a request for approval of the selection of a vendor and authorization to negotiate a contract with the selected vendor. The vendor selection should be summarized in the Project Funding Proposal. The details should be attached as a separate vendor selection report that will be described in the Procurement Planning and Solicitation chapter.

The Project Funding Proposal should be concise and easy to understand. It should not be a collection of technical information, but should state:

- *What is to be done;*
- *Why it is to be done (business value to the City when the project is completed);*
- *How it is to be done;*
- *When it is to be done;*
- *Who is going to do it;*
- *How will it be financed.*

The recommended contents for a Project Funding Proposal are shown below.

1. Executive Summary

The Executive Summary should state the business need being addressed, the priority of the need, the proposed solution and the associated benefits. The executive summary should include a cost/benefits summary containing the elements shown below.

- **Cash flow by fiscal year**, similar to the sample spreadsheet in figure 10.1; The elements that make up each item on this spreadsheet are described in more detail later in this chapter.

ITEM	DESCRIPTION	2000-01	2001-02	2002-03	2003-04	2004-05	Total
1	Dev./Implementation Costs \$'000	5,000	10,000	2,000			17,000
2	Operating cost savings \$'000 (hard cost savings only)			5,000	10,000	10,000	25,000
3	Operating Cost Increases			1,000	1,200	1,500	3,700
4	Cost avoidance		500	1,000	1,500	2,000	5,000
5=2+4-1-3	Net cash flow	-5,000	-9,500	3,000	10,300	10,500	9,300
	Cumulative cash flow	-5,000	-14,500	-11,500	-1,200	9,300	

Figure 10.1

Project Funding Proposal

- **Return on investment percent, if applicable;**
- **Brief summary of Intangible Benefits or Soft Cost Savings;**
- **Priority - why it's important to do this now, and impact on the City or Department operations if the project is not funded;**
- **Risk assessment summary;**
- **Dependencies and impact on the City infrastructure development and other IT projects;**
- **Budgetary impact and proposed source of funds (general or special fund, MICLA, etc.);**
- **Actions requested at this time such as appropriation of funds, approval of new positions, approval of vendor selection.**

2. Project Information

At the minimum, project information should include:

- Project name and brief description
- Sponsoring Department and name of the Executive Sponsor

3. Business Need

A description of the business need that is addressed by the project, expressed quantitatively as much as possible. For example, *“number of permits requested is growing by X% per year, and without this project the time to obtain a permit will grow to X weeks, which is an unacceptable service level”,* or *“the current system cannot meet the new xxxxx rules approved by the City Council”*.

4. Project Objectives

Describe the objectives of the project, both quantitative and qualitative, expressed in terms of benefits such as, service level improvements, productivity improvements, meeting legally mandated requirements, achieving important goals defined by the Mayor and the City Council. An example is: *“reduce the time from receipt of a 911 call to dispatch of a fire engine or ambulance by X %”*.

5. Strategic and Infrastructure Fit

Describe how the project fits into the sponsoring department's strategic business plan and the City's IT architecture, and the impact on the City's computing and network hardware/software infrastructure.

6. The Scope of the Proposed Solution and the Approach

Describe the proposed solution and development approach in terms that management can evaluate.

Project Funding Proposal

The level of detail depends on the phase of the project. The proposal should contain information such as major interfaces to other systems and organizations. Detailed information such as requirements specifications and lists of hardware can be attached as appendices.

7. The Major Stakeholders

Identify the stakeholders and how they will participate and/or be impacted. Stakeholders who must commit resources to the project or who are impacted by the project must approve the Project Funding Proposal.

8. The Proposed Project Organization

Propose a project organization structure and the roles and responsibilities of the participants, including the Executive Steering Committee.

9. Major Internal and External Constraints

Identify project constraints such as staffing, money, time and equipment, or legal, organizational or political constraints. Since these constraints limit the flexibility and authority of the project manager, they need to be identified up front.

10. Project Master Schedule that shows the major deliverables and when they will be delivered.

11. Cost Analysis by Department and Fiscal Year (see sample spreadsheet in Figure 10.2)

A. Total Development and Implementation Costs such as:

- Staffing, new positions and when needed (by month or quarter), and existing positions that will be assigned to the project;
- Related costs (overhead);
- Contractual services including: systems development and implementation, system integration, documentation, consulting, quality assurance;
- Training;
- Hardware and software acquisition, license fees and maintenance agreements;
- Network expansion or improvement, labor and materials;
- Space requirements, facilities remodeling and furniture;
- Travel to visit vendor and user sites, for training or to attend technical conferences;
- Contingency.

Project Funding Proposal

Cost estimates should be based on vendor proposals, historical data or estimator's experience on similar projects.

B. Increases/Decreases in Operational and Support Costs, such as :

- Positions added, eliminated or reassigned in functions such as, machine operations, user support (help desk), application support, hardware and software maintenance, etc.;
- Warranties and maintenance contracts;
- Equipment required to handle workload expansion forecasts or to replace obsolete technology;
- Other operating expenses that will be affected

C. Cost Avoidance (savings)

Funding that would be required if the project is not approved, for example, eliminating the need to add staff to handle workload growth or an unacceptable backlog, or eliminating the need to reassign existing staff to retrofit a legacy system if a replacement system is not funded.

A spreadsheet similar to the example in figure 10-2 should be completed for each department to show the budget impact on each department, and for the project as a whole. Net cash flow is really only meaningful for the project as a whole. **The example is not an exhaustive list of cost elements. Each project will have unique elements that are defined in the cost/benefits analysis.**

Initial cost estimates are often based on availability of funds. Using funding availability to set the overall project budget is fine as long as the scope of the project is constrained to fit within that budget. It is very important not to over-commit on scope, schedule or cost.

12. Budget and Funding Status

Have funds already been appropriated or included in the un-appropriated budget reserve? Have some or all of the costs been included in the proposed budget for the next fiscal year? Is there a requirement to transfer existing budgeted funds from one organization to another or one account to another? What is the proposed funding source, general fund, special fund, MICLA, etc.

13. Justification for New Positions

The justification for new positions includes the job classifications and a description of the duties and responsibilities of the proposed positions. Required start dates should also be provided.

Project Funding Proposal

14. Intangible Benefits and Soft Cost Savings

Intangible benefits are benefits to which cost savings cannot be directly identified. They may be quantifiable service improvements, such as reducing response time to public queries by a day, or just be descriptive, such as improved public relations. Soft cost savings are workload savings that may not translate directly into positions eliminated. For example, saving 1 hour per week for 1000 employees throughout the City probably does not result in elimination of any positions, but does allow the employees to spend more time on other important tasks, which does add value to the City.

15. Risk Assessment and Mitigation/Contingency Approach

A risk is any factor or event that may potentially interfere with successful completion of the project. Typical potential risk factors are:

- *Size and complexity of the project scope;*
- *Maturity of the proposed technology;*
- *Availability of the required skilled staff;*
- *Tightness of the schedule and budget;*
- *Precision of the definition of requirements;*
- *Estimating accuracy.*

Risk assessment and mitigation and contingency planning are discussed in Chapter 12.

Project Funding Proposal

FIGURE 10.2: SAMPLE PROJECT COST ANALYSIS \$'000

ITEM	DESCRIPTION	DEPT.	Fiscal Year					Total
			1	2	3	4	5	
	Development/Implementation Costs							
	Salaries-existing positions (memo: # of positions)							
	Salaries-new positions (memo: # of positions)							
	Related costs (existing + new positions)							
	Equipment							
	Software							
	Materials & Supplies							
	System Integration Contractor							
	QA Contractor							
	Training							
	Travel							
	Additional Space rental & maintenance							
	Other costs							
	Contingency							
1	TOTAL Development/Implementation Costs							
	Operating cost savings (hard costs only)							
	Salaries-system users (memo: # of pos. eliminated)							
	Salaries- programmers (memo: # of pos. eliminated)							
	Related-overhead cost savings							
	Hardware/Software Maintenance costs eliminated							
	Other cost savings							
2	Total Operating Cost Savings							
	Operating Cost Increases							
	Salaries-User help desk (memo: # of positions)							
	Related-overhead costs							
	New software licenses							
	New maintenance agreements							
	Other costs increases							
3	Total Operating Cost Increases							
	Cost Avoidance							
	Salaries for new positions that would be required if the project is not approved (memo: # of positions)							
	Related overhead costs							
	Other costs avoided							
4	Total Cost Avoidance							
5	Net Cash Flow (2 +4 -1 -3)							

Project Funding Proposal

Project Funding Approval Process

The approval process for project funding proposals is a time-consuming process involving several organizations as shown in Figure 10.3 below. The key element of this process is the CAO report prepared by CAO Special Studies and Systems in cooperation with the CAO budget analysts for the departments involved. The CAO staff reviews the proposal for the following:

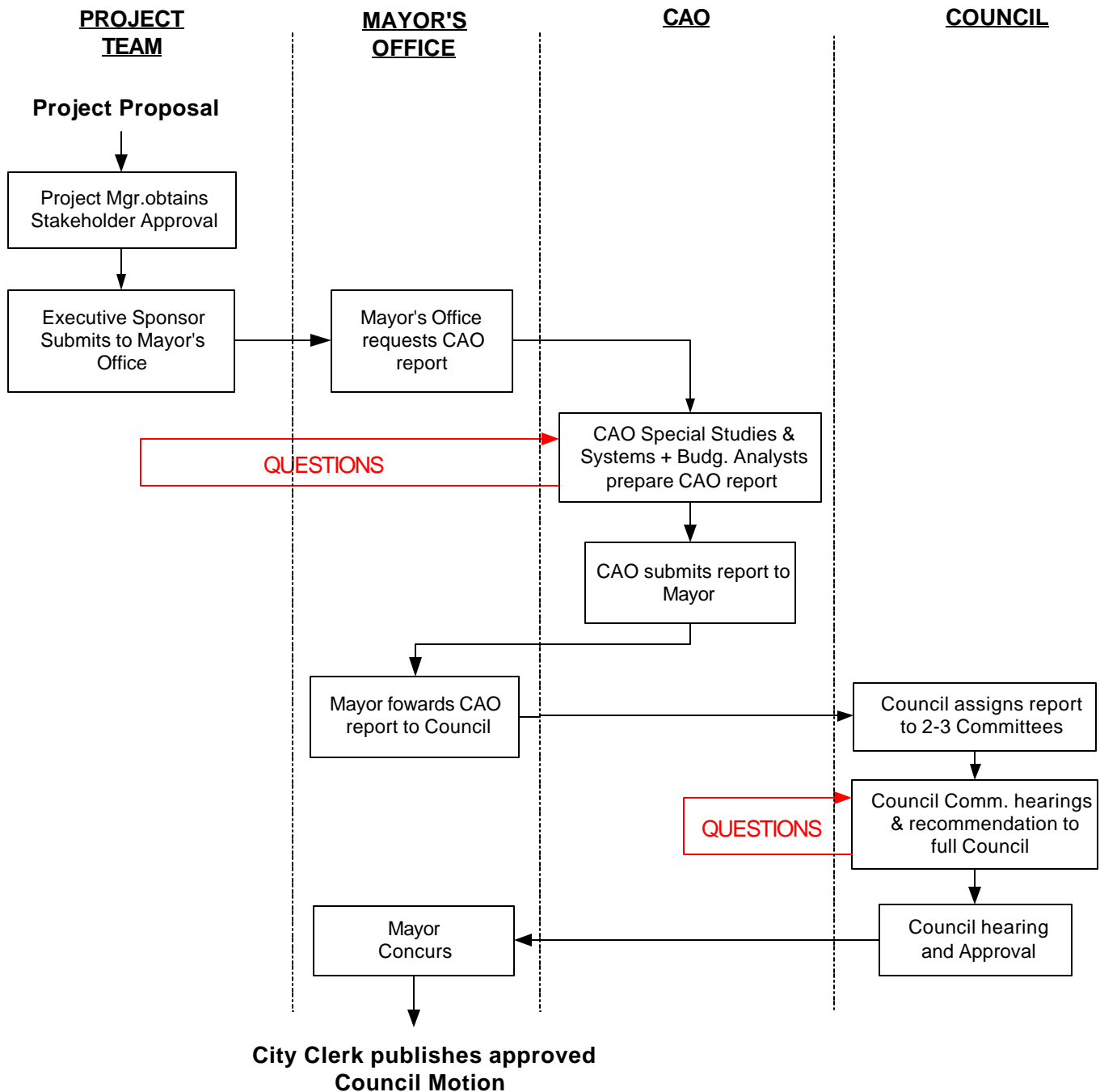
- *a solution that will meet the project objectives*
- *a complete and reasonable business justification*
- *the relationship of the project to the Mayor's published objectives*
- *a staffing plan and other resource requirements that are consistent with the overall project plan*
- *resource and cost estimates that are consistent with accepted industry and City practices*
- *a project plan that is practical and takes into account the known constraints, whether time, resources, financial or political*
- *proper justification supporting any make versus buy recommendation*
- *budgetary impact and availability of funds from the proposed funding sources*

The CAO report recommends whether or not to proceed with the project and specifies all required Council actions, such as, appropriation of funds, authorization of positions and approval of a vendor selection. The CAO report may also include recommendations relating to the management of the project including project organization and the membership and role of an Executive Steering Committee.

The normal cycle time for the Project Funding Proposal approval process is a minimum of 3 months, of which 1-2 months is for preparation of the CAO report. Most projects are reviewed by 2-3 of the following Council Committees: the Committee overseeing the business function, such as Public Safety; the Information Technology and General Services Committee; the Budget and Finance Committee; and the Personnel Committee. The key to minimizing the elapsed time for this process is a complete and clear proposal. The more the CAO must go back to the project manager with requests for additional information, or the Council Committee goes back to the CAO with questions, the longer the process will take. Therefore, it is important to leave sufficient time for the approval process in the project schedule.

Project Funding Proposal

Figure 10.3
PROJECT FUNDING PROPOSAL APPROVAL PROCESS



Cost Planning

RELATIONSHIP AMONG THE PLANNING PROCESSES

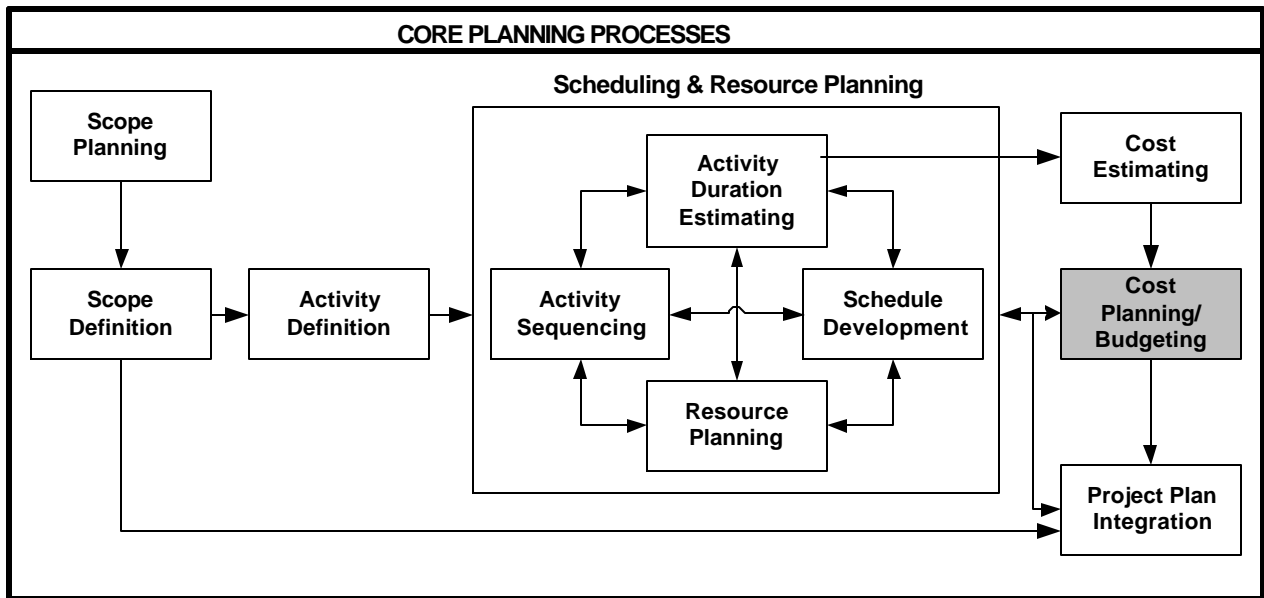


Figure 11-1

Cost Planning Overview

The Project Funding Proposal described in Chapter 10 includes estimated costs by major work break down structure item by fiscal year. When the Project Funding Proposal is approved by the Mayor and Council it defines the approved budget for the project or project phase. The next step is the development of the detailed project work plan following the model in Figure 11-1, including a detailed cost plan.

The purpose of a cost planning is to develop a cost baseline against which project performance can be measured. The inputs to the cost planning process are activity cost estimates, the project schedule, and the funding approved by the Mayor and Council. The output is a detailed time-phased cost plan or “Cost Baseline”.

In the PMI model in figure 11-1 the cost planning process is called “Cost Budgeting”. In order to avoid any confusion between this detailed cost planning process and the City’s fiscal budgeting and funds appropriation processes the term “Cost Budgeting” is replaced by “Cost Planning” in the City’s IT Project Management Methodology.

An important part of cost planning is the establishment of the cost accounting structure that will be used to collect actual costs to compare with the cost baseline. This may require establishing work orders in the City’s cost accounting system or may require a special manual or automated data collection system to collect hours and costs by work package on the work break down structure (WBS) at the level of detail required by management.

Cost Planning

Cost Planning is a bottom-up and top-down iterative management process as shown in Figure 11-2.

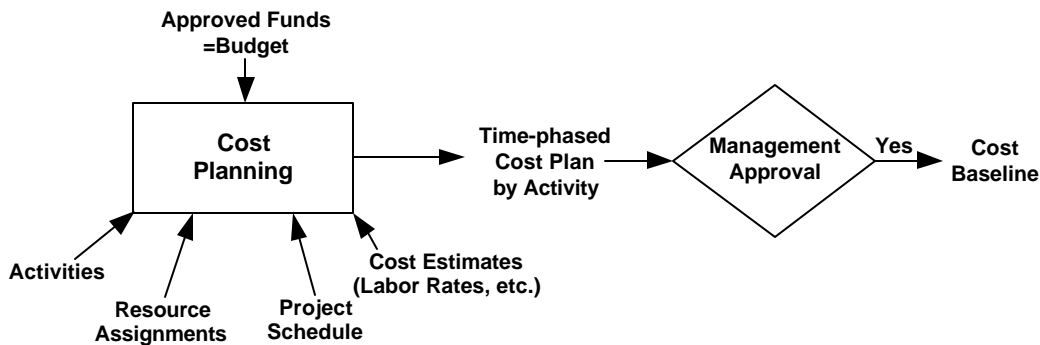


Figure 11-2 The Cost Planning Process

Cost planning is a management process because it requires management decisions when the sum of the bottom-up estimates is not consistent with the available funds. It is iterative because these management decisions involve changing the definition of activities, the resource assignments, cost estimates and the project schedule. Thus, cost planning can be viewed as a cost allocation process, allocating the available funds to the project activities. It is important to save some of the approved funding for unknown contingencies that will inevitably occur. The amount of contingency depends on the project phase and the level of confidence in the definition of project requirements and understanding of exactly what needs to be done in the current phase.

The cost plan becomes the cost baseline for measurement of project performance only after it has been approved by the management and the Project Executive Steering Committee. The cost baseline is changed only under the following conditions with the appropriate approval:

- At the beginning of each new phase
- When a change request with a significant scope, schedule and/or cost impact has been approved

Cost Planning Level of Detail

In order to use a cost baseline for measuring project performance the cost baseline must be developed in much more detail than is required for the project funding proposal. First, the project cost plan must be calendarized by month. Secondly, the cost baseline must be developed for each work package on the WBS down to an appropriate level. In theory the baseline should be developed and costs tracked for every task on the WBS. However, that may not be practical. The WBS level at which the cost baseline will be established and tracked is a management decision that needs to be made as part of the project charter. The decision should be based on the size, complexity, criticality and risk profile of the project, and on the estimated precision of the detailed cost estimates.

Cost Planning

The WBS level at which the cost baseline should be developed is also dependent on the ability to collect actual costs at the same level. When actual costs can only be collected at a high level, resource utilization (labor hours) can be used for project tracking at the lower levels of the WBS.

The project cost plan should include costs of individuals from various departments assigned to the project team and working on tasks on the project WBS whether or not they are shown as dedicated positions in the fiscal budget. The cost plan should not include the time of users and management who participate in workshops and other project meetings on an occasional basis.

Cost Planning Outputs

There are two important outputs of Cost Planning. The first is the detailed cost baseline by task by account as shown in the sample spreadsheet in figure 11-3:

Sample Project Cost Budget Spreadsheet

WBS No.	Task Name	Start Date	Compl. Date	Resource Group	Acc't No.	Labor Hours	Labor \$'000	Non-Labor \$'000	Total Cost \$'000

Figure 11-3

In the above example Resource Group can be an organization (department, vendor, etc.) or a particular skill group or a job classification. Account number is included to make it easier to segregate different non-labor costs. The spreadsheet shows the total cost by work package, and the breakdown into major cost elements. The start and completion dates are shown because they are needed in the next step, which is the development of the time-phased cost baseline by work package. Non-labor cost is used to include costs such as hardware, software, supply, facility, and maintenance agreement.

Cost Planning

The second view of the cost baseline is the time-phased cost plan as shown in the graph in Figure 11-4.

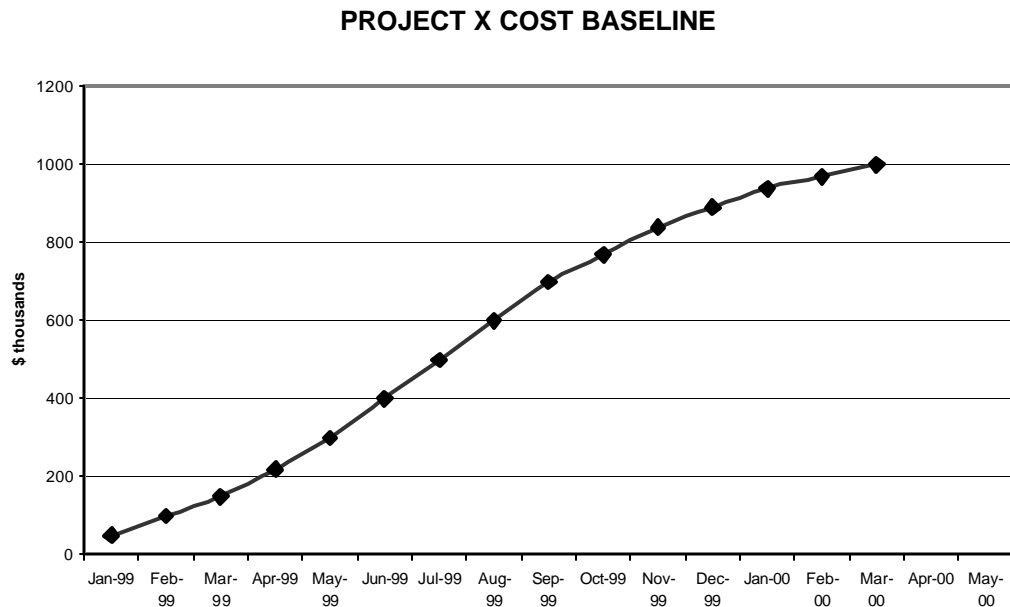


Figure 11-4 Cost Baseline Chart

The above chart can be prepared for the project as a whole and for major work packages for which different individuals or organizations are responsible. For example, separate charts may be drawn for the total costs of internal City tasks and for the costs incurred by a systems integration contractor.

Risk Management

Risk Management Overview

A risk is any factor or event that may potentially interfere with successful completion of the project. Every project has associated risks, both internal and external. Internal risks are related to things that the project team can control or influence, such as, staff assignments, project scope and cost estimates. External risks are events that are beyond the control of the project team, such as an unexpected new City ordinance, a management reorganization or a natural disaster.

Risk management consists of:

1. Risk Management Planning:
 - Identifying potential risk factors or events;
 - Assessing the likelihood of their occurrence and the potential impact on project quality, schedule and cost;
 - Developing risk mitigation plans, i.e. preventive actions that will minimize the probability of a risk becoming reality or minimize the impact thereof;
 - Developing risk response or contingency plans, i.e. what to do if and when a risk event occurs or becomes imminent.
2. Risk Management Control:
 - Monitoring the status of potential risk factors and events, looking for symptoms that indicate a risk event is imminent and updating the risk assessment information;
 - Monitoring the risk mitigation activities to ensure they are completed;
 - Executing the risk response plan when a potential risk becomes reality;
 - Reporting status versus the risk plan as part of routine project status reports and reviews.

Risk Management Planning

It's Better to Solve a Problem before it Becomes a Problem!

The most important part of risk management is risk management planning, because, with a good risk management plan the project manager can minimize the probability of occurrence of a risk event and minimize the negative impact should such an event happen.

The Risk Management Plan documents the procedures for managing risk throughout the project. In addition to documenting the results of the risk identification and analysis phases, it must cover who is responsible for managing various areas of risk, how risks will be tracked throughout the life cycle, how contingency plans will be implemented, and how project reserves will be allocated to handle risk.

Risk Management

Risk Identification and Assessment

The first step in Risk Management Planning is to identify and quantify, to the extent possible, the potential risks associated with a project. Risk identification consists of determining risks that are likely to affect the project and documenting the characteristics of those risks. No attempt should be made to identify all possible risks that might affect the project, but anything likely to occur should be included in the analysis. Risk identification and assessment are recurring tasks that need to be performed throughout a project, from development of the Project Funding Proposal and the Project Charter, to every stage of project planning and control.

Risk identification and assessment is the responsibility of all members of the project team. The project manager is responsible for tracking risks and for developing contingency plans that address the risks identified by the team. A risk identification “brainstorming” session can help in the initial identification process. Such meetings help team members understand various perspectives and can help the team better understand the “big picture.”

Risk identification begins in the early planning phase of the project. The Risk Profile Summary shown in Figure 12.1 should be used to document the risks. After the project starts, the Risk Profile Summary should be continuously reviewed and updated. The Risk Profile Summary categorizes the risks into the risk factors shown below.

Common Risk Factors

Some of the common risk areas are shown below along with questions that you may ask yourself when trying to identify and quantify project risks. You will see questions that overlap categories because risks are often inter-related. The list is not intended to be an exhaustive list of questions, but rather something to stimulate thought.

1. Project Scope and Complexity:
 - Is the scope as documented in Scope Planning and Scope Definition well understood and supported by all the stakeholders? Are there controversial issues that have been quieted temporarily but may be raised again as the project progresses?
 - Is the project scope well understood by the project team?
 - Are requirements complete and well documented?
 - Is the project scope expected to be stable, or are there external forces that may force changes over time?
 - Is the project duration so long that requirements are likely to change due to changes in the environment and the organization?
 - How complex is the project considering factors such as: technology; complexity of the business processes; numbers of users, user organizations, geographical sites and interfaces with other systems?

Risk Management

2. Technology:

- Does the project depend on new unproven technology?
- Are there successful implementation sites that can be visited?
- Is the project team, including both City staff and vendors, experienced in the technologies that will be utilized?
- Do the technologies fit the existing City infrastructure and standards, or is there a requirement for significant changes to the infrastructure or standards?
- Is hardware delivery on the critical path, and is planned delivery time normal or tight?
- Do hardware/software vendors have reliable performance records and responsive support?

3. Staffing:

- Have all the stakeholders committed adequate resources to the project?
- Is there a risk of key resources being pulled off for other projects perceived as higher priority by their line management?
- Is the project team, including both City staff and vendors, experienced in the technologies that will be utilized?
- Is project success highly dependent on one or two key people with specialized skills?
- How many key members of the project team have successfully completed a similar project, or will this be a new experience for the whole team?

4. Cost Estimates:

- Are time and cost estimates based on well-documented history?
- Do the estimators have experience on similar projects utilizing similar technologies?
- What is the estimated precision of the estimates?
- Have the estimators consistently displayed an aggressive or conservative bias in estimates for other projects?
- Is the WBS and are the task definition statements complete, well documented and well understood?
- To what extent have estimators included contingencies in their estimates?

Risk Management

5. Organization and Culture:
 - How well does this project fit the culture of the City and the departments involved?
 - How ready is the client or user organization to accept and implement changes in the business processes and job content and classifications?
 - Does the project require difficult negotiations with labor organizations on pay, benefits and job classifications?
 - Is there an adequate communications plan to keep stakeholders at all levels informed and involved?
 - Is there a risk of organizational changes that may impact the project and the management support of the project?
 - Are there significant differences among the objectives of the stakeholders that could generate difficulties later in the project?
 - Is there strong commitment and support by management and elected officials for this project?
6. Project Management and Organization:
 - What is the level of project management experience of the City and vendor project managers and team leaders?
 - Is there a strong and supportive Executive Sponsor and Executive Steering Committee?
 - What is the reporting relationship of team members to the Project Manager, direct line or matrix? Who is responsible for the personal development and performance appraisals of the project team members?
 - Is there a good process in place for user input and involvement?
 - Is the project team physically in the same location with the customer, or in a remote location?
7. Schedule and budget:
 - Is there an externally imposed tight deadline or budget limitation that significantly increases the risk of quality problems, schedule slippage or cost over-runs?
 - Is the project fully funded, or dependent on future funding for completion? If it is not fully funded, what is the chance that future funding may not come through?

Risk Management

Risk Quantification

Once risks have been identified they need to be quantified to the extent that is practical. The first issue is the probability of occurrence. Whereas some people may try to assign percentage probabilities of occurrence, this may imply a level of precision that probably is not realistic. A more reasonable approach may be to assign high, medium or low probabilities, with some qualifying words describing the conditions under which the risk event would be most likely to occur. Knowing these conditions may be helpful in monitoring risk and detecting when an unlikely event has become much more likely. As pointed out above, there is little value in identifying risks that have a very low probability of occurring unless the potential impact is so large that it overshadows the low probability. For some projects the earthquake risk should be identified and quantified, whereas for others it is not important.

The second aspect of quantification is the potential impact on quality, schedule and cost. This can be done at an order of magnitude level. Some events may set a project back 1-2 months, others 1-2 years with, for example, 10% or 100% cost overruns.

The result of risk quantification is an overall assessment of project risk and the establishment of schedule and cost contingencies for the project. The percentage of contingency will depend on the project phase. For example, contingency at the end of the feasibility phase may be as much as 100%, whereas it may be only 10% when design has been completed. Since there is a tendency for everyone to put some contingency in the detailed estimates that are behind the overall project estimates, it is important that the Project Manager has some understanding of the magnitude of the hidden contingencies when developing the overall contingency.

The output of risk assessment and risk quantification is documented in the Risk Profile Summary in Figure 12.1 below.

Risk Management

Risk Mitigation

Risk mitigation involves preventive actions to reduce the probability of occurrence of risk events and/or minimize their impact. Following are some typical risk mitigation actions:

- Establish schedule and cost reserves to cover a reasonable level of risk event occurrences.
- Document all planning assumptions and communicate them to the stakeholders.
- Break the project into smaller, more manageable, phases and work packages.
- Assign and train backups for the key skilled positions.
- Impose tight change control.
- Establish a Quality Assurance process by using either an outside contractor or expert City staff not working on the project.
- Insist on formal signoffs of all key deliverables.
- Establish several key management checkpoints at which overall project status and risks will be reviewed and necessary management decisions will be made (continue the project, change the direction, go back to Mayor and Council for additional funding).
- Ensure the Executive Steering Committee has proper stakeholder representation at a decision-making level.
- Ensure a high level of user involvement and communication with users.
- Provide accurate and concise project status reports, identifying all management issues and symptoms of potential risks becoming realities.
- Set up redundancies and backup procedures for the development of hardware/software.

Contingency Planning

Whereas risk mitigation is primarily preventive in nature, contingency plans are pre-defined action plans that can be implemented if identified risks actually occur. Contingency planning can be viewed as a sub-set of risk mitigation planning. If a good pre-defined action plan exists in the event a risk becomes reality, it is likely that the impact of the risk will be minimized. An earthquake preparedness plan is a typical contingency plan. The utilization of approved schedule and cost reserves may be part of the contingency plan for some risk events. For other events the plan may require going back to the Mayor and Council for approval of changes to the project with or without additional funding.

As a guideline, contingency plans are developed for the top five risks associated with a project. For large projects the top five risks of each major sub-system may be actively tracked. To properly implement a plan, a reserve is usually required where dollars and/or time are held by a project manager to apply to the execution of a contingency plan. Such contingency reserves are discussed in the appropriate sections of planning. Without maintaining a reserve, the project manager is forced to go back for additional time or dollars for every risk as it becomes a problem. It is far more desirable to maintain a level of reserve where problems can be dealt with from within the original budget and schedule of the project.

Risk Management

Risk Management Plan

There are some situations where nothing can realistically be done to prevent or deal with a risk. In this case, the project must be managed in such a way that the probability of the event occurring is minimized. If the event does occur, the project manager must update the project plan to include the impact of the problem.

The Risk Management Plan should be a living document that starts as a section of the Project Funding Proposal, is formalized in the Project Charter and is updated throughout the project planning and control processes. The contents should be:

1. An executive summary that describes very briefly the top 3-5 risk factors and the associated mitigation and contingency plans, and establishes and documents the justification for the overall schedule and cost reserves to utilize for contingencies;
2. A Risk Profile Summary such as figure 12.1 below. This provides a simple format for summarizing the risks associated with a project;
3. The Risk Profile Summary should be supported by a more detailed document describing the assumptions, the most likely or most critical risk factors, and the associated mitigation and/or contingency plans. For example, the summary may list software training as a mitigation approach. The detailed document should provide more information on who needs to be trained and the type of training required.

The Risk mitigation activities should be included as tasks on the project WBS and the project schedule. The contingency plans cannot be included up front, but will be incorporated in the project plan if and when risk events occur.

Risk Management

Figure 12.1 Risk Profile Summary

Risk Factor /Event: (short description)	Probability (Hi-Med-Lo)	Quality, Schedule, Cost Impact - Summarize	Mitigation Approach or Contingency Measures	Status (* denotes changes this reporting period)
PROJECT SCOPE AND COMPLEXITY				
TECHNOLOGY				
STAFFING				
ESTIMATING PRECISION & EXPERIENCE				
ORGANIZATION & CULTURE				
PROJECT MANAGEMENT				
TIME DEADLINE AND/OR BUDGET LIMITATION				
OTHER				

Risk Management

Risk Control

As the project evolves through the various project life cycle phases, the ability to define and specify the risk items increases. This is attributable to the fact that more is known about the project and the associated issues.

During the execution period, risks are more definitive, and tangible resolution strategies emerge. This allows for the development of more detailed contingency plans, including specific action plans. These should be reflected on the updated Risk Profile Summary. Changes to the summary should be flagged with asterisks or comments so that the reader can easily identify new or changed risk factors, probabilities of occurrence and potential impact. Risks that are reduced or even eliminated should also be noted. A status column has been provided on the profile for such comments.

Updating the status of the risk events can best be done concurrently with the analysis of plan variances for project status reporting. Usually a plan variance will impact the probability of a risk event occurring, or the variance may be caused by the occurrence of a risk event.

Responsibility for Risk Management

The project manager is responsible for ensuring that risk management is performed throughout the project. Risk control responsibility is assigned in the Project Initiation phase and is documented in the Project Charter. Responsibility may be assigned to a single Risk Manager, or delegated to several project team leaders. During the planning stage risk management is usually performed by the project manager. During implementation, risk management may require a separate full- or part-time position to handle the workload.

The Risk Manager(s) should:

- Be senior enough in the project organization structure that they will have the ability to request that specific risk contingency plans be assigned and staffed;
- Attend the project management status meetings;
- Have an understanding of the overall project.

Risk Management

Risk Management Reviews

Risk management requires continuous monitoring of risks and regular risk management reviews, which should include:

- **Risk Assessment Update Meetings.** It is during this process that the Risk Profile Summary is reviewed and updated.
- **Project Status Meetings.** On a weekly or bi-weekly basis (depending on the cycle chosen for the project), the individual(s) responsible for risk management should report to the project status group on the current status of project risk. The report should be based on the updated Risk Profile Summary, including information on all contingency plans currently underway.
- **Executive Review Meetings.** A summary of the top risk items for the project is included in the executive project review meeting. This should be not more than one page and should list the risk, state the defined resolution, and indicate the current status.

Monitoring Risk Mitigation Activities

Risk Mitigation activities are usually tasks on the project plan that are performed before risk events actually happen. They need to be monitored in the same way as all other tasks on the plan. In some cases mitigation is accomplished by establishing schedule and cost reserves. Thus it becomes very important to track and monitor the utilization of these reserves.

Monitoring Contingency Plans

At the start of project execution contingency plans for major risk events may be quite general. However, as a project progresses, the occurrence of certain risk events may start to become more likely, or the potential impact becomes larger as the investment in the project grows. This creates a need for the development of more detailed and more specific action plans. Thus contingency plans are living documents that change as the project progresses. Identification of the need for such changes is an important part of Risk Management Review meetings, the results of which should be presented to the stakeholders in project status reports and project reviews.

Historical Record

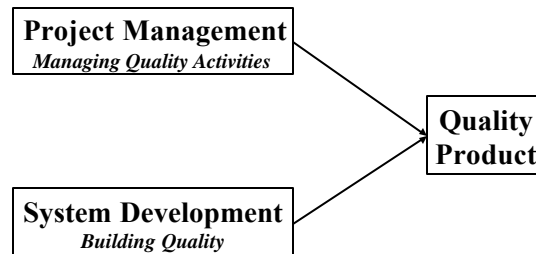
It is always a good idea to maintain a history of the project risks. This information can be used as “lessons learned,” and the project team can benefit from reviewing past risks and occurrences.

Quality Management

Quality Management Overview

One of the most important developments in quality management in the past several decades is the change of focus from product inspection to process management. Quality cannot be inspected into products. For IT projects, quality must be built into the final product through systems development processes and managed as an integrated part of IT project management. Figure 13.1 shows this basic theme in a graphical form.

Figure 13.1 Where does quality come from?



This chapter includes the following sections:

- The total quality concept;
- A quality management model specifically designed for IT projects, and a description of the major components of the model;
- Quality management roles and responsibilities; and
- A checklist of common quality tasks in a typical systems integration project.

The Concept of Total Quality and Its Application to IT Projects

Quality assurance as a function of project management is based on the concept of total quality. Total quality means that quality management is an important task throughout the systems development life cycle instead of merely in the testing stage. Total quality also means that quality is everybody's responsibility, not just the job of the quality assurance manager. Although the total quality concept applies to all industries, it is particularly important for IT projects. The traditional, inspection-based quality control methods are not applicable to IT projects, which have mostly non-repetitive operations and many quality attributes that are difficult to measure quantitatively.

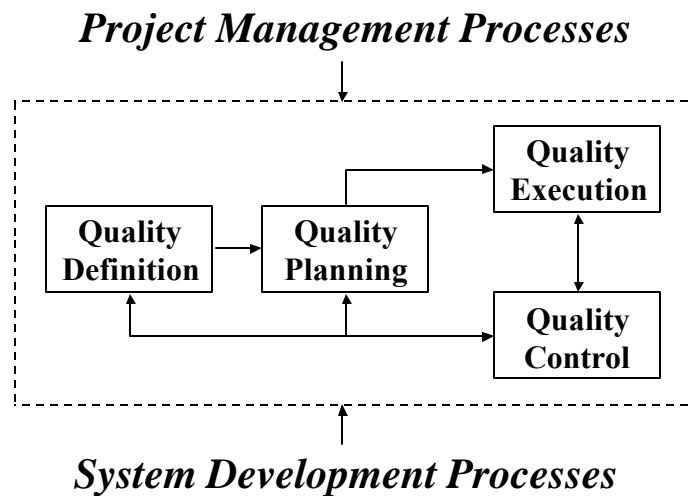
Many issues discussed in other chapters, such as scope definition and change management, can significantly affect the quality of a project. The quality management model introduced in this chapter incorporates these issues. The emphasis of this chapter is on the aspects of these issues that have the most significant impact on quality management.

Quality Management

***Quality
Management
Model***

The quality management model is a framework of major quality management components and their interrelationships. Figure 13.2 is a quality management model that is consistent with ISO (International Standards Organization) 9000 standards.

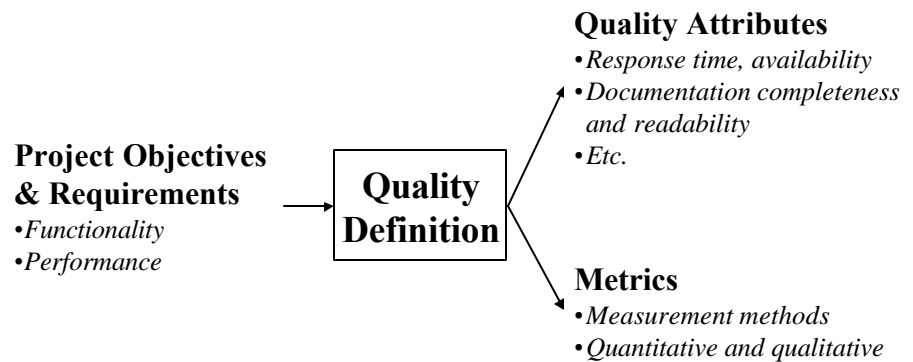
Figure 13.2 Quality Management Model for IT Projects

**Quality Definition**

Successful quality processes always strive to see quality through the eyes of the customer. The customer is the ultimate judge of the quality of the product. The customers will typically judge a project by whether or not their requirements are met. To ensure delivery of a quality final product, each phase of the project should ensure that requirements are addressed. Figure 13.3 shows the inputs and outputs for quality definition.

Quality Management

Figure 13.3 Quality Definition



Quality definition inputs

The quality definition inputs are the *project objectives and requirements*.

The project objectives must be defined clearly based on the business needs of the user and the scope of the project. The project objectives set the general guidelines for the development and prioritization of the requirements.

System requirements are specified in terms of functionality and performance. These requirements should be defined as early as possible. It does not mean that the requirements will not change throughout the life of the project. In fact, as part of the quality assurance effort, these requirements may be revalidated in various stages of the project. It is important for the implementation team to work together with the users and make changes in the early stages of the project when changes can still be made without serious negative impact on schedule and cost. Major changes in requirements can be costly and may even cause project failure. It is therefore important to enforce strict change management procedures to ensure that the changes are feasible, are justified and have the appropriate management approval.

Quality Management

Quality definition outputs

Quality definition generates the following outputs:

- *Quality attributes:* Once the requirements are understood, a set of quality attributes can be defined. The quality attributes should be defined so that they reflect all aspects of the project. Specifically, quality attributes can be classified into the following two categories:
 - a. Attributes of the final product: These are attributes that specify the functionality and performance of the final product. Examples include customer waiting time, ease of operation, failure recovery capabilities and time, etc.
 - b. Attributes of the intermediate deliverables: To ensure the quality of the final product, quality should be measured at specific intermediate points during the systems development cycle. The quality attributes of the intermediate deliverables include user buy-in of the requirements, the design's potential capability to satisfy the requirements, and adequacy of test plan coverage of the requirements.
- *Quality metrics:* The project team must operationalize the quality attributes by specifying how each quality attribute will be measured. Measurements, including the measuring methods and conditions, must be defined clearly. For example, "average response time" is not a meaningful measure unless the assumed traffic volume is given.
 - a. Quality metrics for the final product may include maximum waiting time for 95% customers, number of clicks required to find certain information, required recovery time for certain failures, etc.
 - b. Quality metrics for intermediate deliverables may include level of user buy-in of requirements based on a survey, user approval of the functional design, and how well system documentation follows the City's or the project's documentation standards.

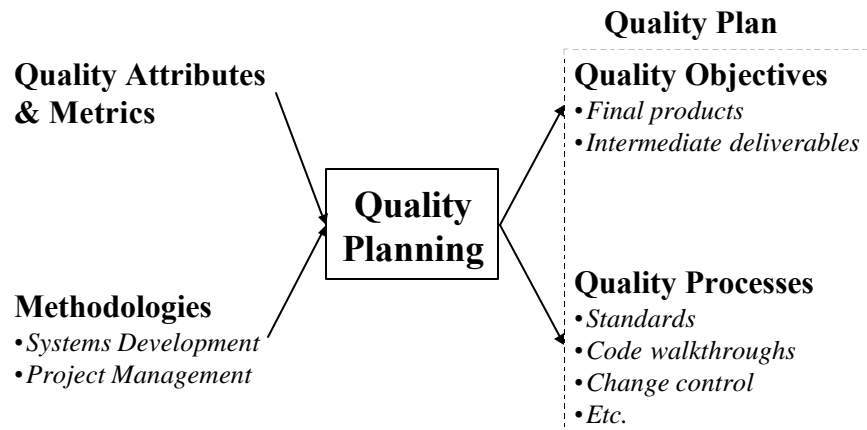
It can be seen from the above examples that some quality metrics are measurable quantitatively, whereas others are qualitative, based on the judgment of individuals with the appropriate skills and experience. A quality checklist can be developed as part of the quality definition process. Such checklist is usually developed individually for each project.

Quality Management

Quality Planning

Quality planning is essential to effective quality management. Quality planning starts with the quality definition and the best practices documented in the system development and project management methodologies. The major deliverable of quality planning is a quality plan that specifies the quality objectives and the quality processes for the project. Figure 13.4 shows the basic elements of quality planning.

Figure 13.4 Quality Planning

**Quality Objectives**

Essentially, the quality objectives describe “what” to build. The objectives include acceptance criteria for the final product and the targeted values of the intermediate deliverables, such as performance targets for individual components of the system and the targeted level of user buy-in of the design.

Quality Processes

The quality processes on the other hand describe “how” to build quality into the final product. These processes are the standards, procedures, activities, and organizational resources needed to achieve the quality objectives. Examples of the quality processes include standards reviews, joint application development (JAD), requirements and design reviews, prototyping, code walkthroughs, change control, test plans, and training plans. It should be noted that these processes are not “additional” processes; they are a part of the systems development and project management methodologies used by the project.

Quality requires time and resources. Each project must determine what is the appropriate balance among quality, schedule and cost. Although specific considerations vary among projects, general considerations include project objectives and constraints, the additional benefits of improved quality versus the additional time and resources required.

Quality Management

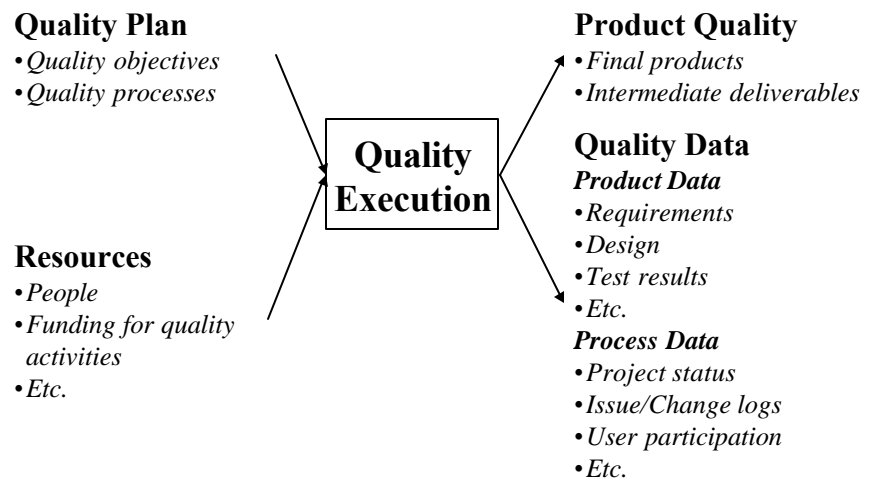
Quality Execution

A quality plan should be an integrated part of the overall project management plan. The main purpose of the quality plan is to ensure that the quality related systems development and project management processes are in place and will be executed properly. Some projects will not require a “unique” quality plan, but can “borrow” a plan from a similar project. Many quality activities, such as user review of the design, are included in the project schedule as activities that take time and require resources. Others, such as acceptance by the user, are milestones in the schedule.

Quality execution refers to the execution of the quality management plan during the execution phase of the project. This includes procedures, methods and techniques that can be used to enhance quality during the execution phase of a project. Performing the acceptance test as specified in the quality plan and applying the change management procedure when making changes are examples of executing the processes that contribute to quality assurance.

Figure 13.5 depicts the information flow in the quality execution process. The input includes the Quality Plan and the resources necessary to carry out the tasks. The output includes actual product quality achieved and quality related data collected during the execution phase. Quality data include both data on the product and data on the processes. These data will be the inputs to the quality control process.

Figure 13.5 Quality Execution



Quality Management

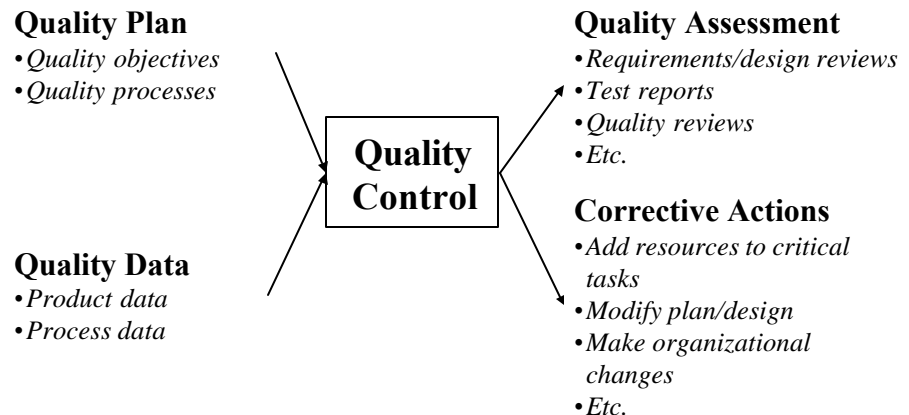
Quality Control

This process starts by comparing the actual performance observed during the *Quality Execution* process with the quality objectives and target measures of the quality attributes defined in the *Quality Planning* process. Deviations from the target should be analyzed. The Project Manager/Quality Assurance Manager must assess the situation and determine whether corrective actions are needed. This process will be repeated on a regular basis throughout the entire project.

The outputs of *Quality Control* are quality assessment documents and corrective actions. Quality assessment documents include formal evaluation reports, such as documentation of requirements reviews, design reviews, formal tests, and walkthroughs, etc. The quality section of status reports and quality reviews are also examples of quality assessment documents. If applicable, quality assessment output may also include independent verification and validation reports, and quality audit reports.

Examples of corrective actions include adding resources to the critical tasks, modifying the design or project plans, implementing organizational changes, and resolving disputes. Figure 13.6 shows the model for the quality control process.

Figure 13.6 Quality Control



Quality Management

Quality Assessment

Project control issues are also discussed in other chapters of this Methodology. Project Execution and Control (Chapters 14 through 22) and Risk Management (Chapter 12) are particularly important to quality control.

In quality assurance, prevention is always better than damage control after the fact. Because of the nature of IT projects, quantitative process control methods are of little use in project management. Experienced managers, however, can detect problems that can develop into serious quality problems early and solve the problems before they cause serious consequences.

Quality assessment is conducted by using some or all of the following processes:

- **Evaluation:** This includes evaluation of the intermediate deliverables, project status, and variance analysis. Evaluation of project management practices is also necessary to ensure the use of generally accepted best practices, such as those documented in this Methodology.
- **Validation and verification:** This process validates that the documented requirements will be satisfactory to the customer and verifies that the design and the product as built meet the requirements. It is counterproductive to develop a system that meets a documented requirement if the requirement has already changed. Validation and verification should be done at certain milestones of the project, such as after major tests, at the end of each phase of the project, etc.
- **Acceptance testing:** This is usually the final test of the system. This test is performed independently by the user prior to acceptance of the system. Typically, the system will have passed unit tests, integration tests and system tests before it is ready for user acceptance test.
- **Quality audits:** These are systematic reviews of project quality. The audits can be done by internal experts or by third parties with specific expertise. The audits may coincide with major milestones and/or the ending of a project phase.

Quality Management

Roles and Responsibilities

If quality assessment discovers major deviations from requirements, specifications, or stakeholders expectations, rework may be necessary to bring the rejected items into compliance. Rework is usually very costly. Good quality assurance will minimize the need for rework.

Quality management in large-scale, IT-based systems integration projects involves some or all of the following functions:

- Quality assurance management
- Independent validation and verification
- Quality audit
- Quality oversight

Quality Assurance Management

Quality assurance management refers to the management of all quality related project activities. Specifically, these activities include the four QA processes in Figure 13.2, which are definition, planning, execution and control. The Quality Assurance Manager is the individual who will manage the quality assurance activities and the resources required to conduct these activities. The Project Manager may take the responsibility of the Quality Assurance Manager if the project team is relatively small, or may delegate this responsibility to an experienced team member. In either situation, it is the Project Manager's responsibility to ensure that the final product of the project will achieve the project objectives set by the project's Sponsor. Typically, a quality team is formed within the project team. The team assures that the quality plan is executed as planned. This quality team reports to the Project Manager.

Although the Quality Manager is the center of all quality assurance activities, every project team member needs to buy-in to the responsibility for producing a quality product. A sound quality plan cannot rely on "adding" quality at the end of a process. Quality must be built into product through the work of each and every individual on the project team. It is far more cost effective to have team members add quality into their day-to-day jobs than to have a quality analyst find a problem after a process has been completed.

Independent Validation and Verification (IV&V)

Independent validation and verification refers to using outside experts to provide an independent opinion on major project issues such as requirements, design, and/or technology used by the project. These outside experts work for the project.

Quality Management

Quality Audit

Usually, IV&V is done at key project milestones. Outside experts will provide specific technical and/or functional expertise that the team lacks. They will participate in project reviews and provide their specialized experience and an independent perspective.

Quality audit is an after-the-fact comparison of the actual performance and project status against a standard, a quality objective, or a plan. This is usually done when the project appears to be in trouble, and the Project Manager and the team are unable to provide an adequate explanation. Quality audits must be conducted by experienced experts who are also independent and may give an objective evaluation of project quality. These experts may come from within the City or hired from outside. As the City's quality processes mature, however, the need for the external quality expertise decreases.

When used properly, a quality audit can identify problems in the project and the causes of the problems. But it does not add quality to the project by itself. Real quality improvement relies on the effort of the individuals working on the project. In addition, audits take time and resources. They tend to extend the project schedule and require additional funding. Therefore, use of outside quality auditors should be limited to exceptional cases.

Quality Oversight

Quality oversight is part of project oversight. It is a management function that includes the following three aspects:

1. Business function oversight: The project Sponsor and the users provide this oversight to ensure that the system meets or exceeds the business needs that triggered the project.
2. Technical oversight: ITA works closely with the Project Manager to develop solutions to all IT problems and oversee the technical aspects of the project to ensure the achievement of the project objectives set by the project Sponsor and the proper fit of the project to the City's IT infrastructure and overall IT strategy.

Quality Management

Common Quality Management Tasks**Requirements and Design**

3. Project management oversight: The Mayor and Council review and approve the project objectives and business justification. The Mayor and Council also oversee the project's schedule and budget. The Mayor and Council may appoint a Steering Committee to provide this oversight on their behalf. ITA's Project Management Support office works with the Project Manager to enforce the use of the best practices in this Methodology.

Quality oversight cannot be performed by an outside vendor. The City leadership and City managers must take this responsibility and provide the appropriate checks and balances to the project. It is unrealistic to hope an outside vendor can offer any of the quality oversight described above. Hiring a vendor to oversee quality management of a project will increase cost and project duration, and decrease effectiveness of oversight.

Quality management tasks and processes in a typical systems integration project can be divided into two categories: the tasks and processes for a specific stage of the project and the tasks and processes that continue through the entire project. These tasks and processes are an integral part of the overall project plan. The following list of tasks will be coordinated with the project's master plan and modified to suit the specific needs of the project.

1. defined goals, objectives, and the scope of the project
2. Set quality criteria and identify standards and regulations
3. Identify user requirements through visits to the user departments, documenting business processes, and user participation in the design process
4. Benchmark against best practices available
5. Conduct reviews and audits on design, if necessary:
 - Internal: by ITA and/or user departments
 - External: by an IV&V or QA vendor specializing in the type of system being built
6. Submit the design for review approval

Quality Management

Procurement

7. Use the vendor selection procedure described in the Methodology. Specifically, the following should be performed to assure quality of the vendors and the purchased items:
 - Review vendor qualifications, including their reputation and past performance, especially their performance with the City if applicable
 - Check compliance with the City standards and regulations
 - Check the functional and performance quality of the proposal and/or product: examine specifications and supporting evidence to ensure that the proposal and/or products do have the potential to achieve the objectives of the project
 - Submit the selection for review and approval
8. Receiving and Inspection:
 - Verify the items received with the design
 - Inspect the purchased items, if applicable: The procurement plan and/or the quality management plan will include an inspection plan, which indicates the items to be inspected, and the inspection or test methods and procedures.

Building the System

9. Review the work results periodically and take corrective actions as needed
10. Perform walk-throughs and technical analysis at each major milestone
11. Perform technical tests including
 - Unit/component tests
 - Network test
 - Configuration test
 - Integration test

Conversion

12. Check completeness and integrity of the databases
13. Perform functional and performance tests
14. Document the technical and application information
15. Train the managers and staff of the new system

Quality Management

Acceptance

16. Perform acceptance test

17. Submit the test report for approval

**Tasks and processes
for the entire project**

18. Establish scope management, change management, and risk management processes as detailed in the Methodology

19. Report project status on regular basis and after each major milestone to ensure timely communication to all stakeholders

20. Submit major changes, resolutions of issues, and corrective actions for approval

Project Executing & Control

Overview

What Happens During Project Execution

Once the baseline plan has been developed, approved, and the necessary resources put in place, the project moves into the execution phase. The Project Manager's focus now shifts from planning to executing and controlling according to the commitments made in the project plan.

Project Control Process

The project plan serves as the basis for the project's monitoring, controlling, and reporting activities. During project execution, the project manager is responsible for coordinating data collection, monitoring, and reporting project activities. Information should be made available to accurately identify issues and problems early so that project risks can be minimized.

The next series of documents deals with the "control" of the project after it has begun. This involves processes that need to be in place to ensure that the project progresses according to the plan. During tracking, monitoring, and reviewing, the project team assesses the current state of the project. This includes the following activities:

- Review the completed activities.
- Identify milestones reached.
- Identify problems or issues such as a change request.
- Update project schedule and progress information.
- Update budget and calculate variances.
- Take corrective actions

This process is depicted in Figure 14-1 on the next page.

Overview

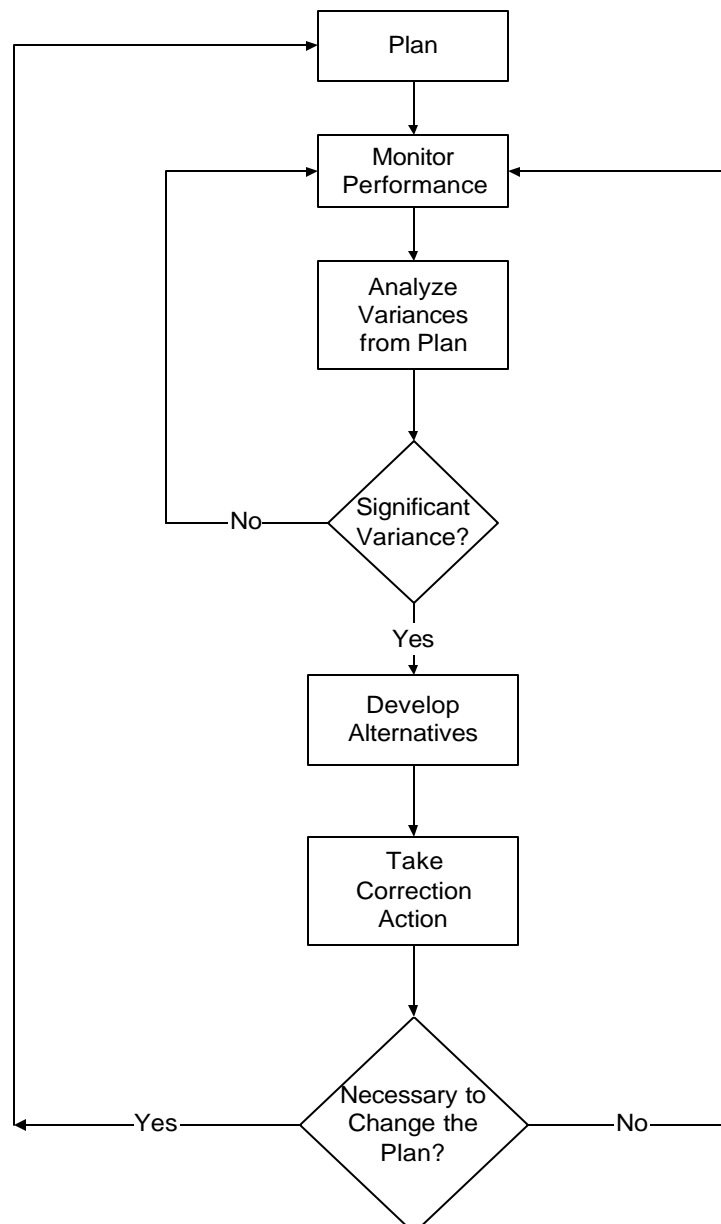


Figure 14-1
The Control Process

Project Executing & Control

Overview

***Preventing Problems
is a Better Course
than Fixing Them***

Controlling, as shown above, consists of collecting data to monitor performance against the plan, analyzing variances from the plan, deciding whether corrective actions are necessary to bring performance back on plan, and deciding if the plan needs to be adjusted or changed. A plan adjustment is a change to the internals of a plan, such as adding resources or changing the sequence of activities, that does not change the overall project scope, schedule or cost. A plan adjustment does not require the approval of all the stakeholders, only those directly affected. A plan change involves a change in scope, quality, schedule or cost that must be approved by all the stakeholders. Finally, project status and any actions taken or recommended need to be communicated regularly to the stakeholders including team members, management and the users.

Projects fail due to inattention to basic control principles. Too many times the project team is busy getting on with “completing the project” and not spending the time and energy to understand the status of the project and to identify problems. Then, once a problem emerges, the team acts too slowly to resolve the root of the problem.

The purpose of the project management control process is to identify potential problems early and prevent them from happening, or if that is not possible, minimizing their impact. Preventing problems is far easier and less costly than solving them. Listed below are some potential problems that may arise.

- Lack of good data on activity progress.
- Inadequate definition of requirements.
- Frequent and uncontrolled changes to the baseline requirements.
- Poor time and cost estimates.
- Difficulties in concluding tasks and projects because of lack of completion criteria.
- Frequent replacement of personnel.
- Inadequate tracking and directing of project activities.

One of the most common problems is that the project manager, and possibly the full project team, is unaware of the existence of a major problem at a stage when it could be contained and eliminated. This can be resolved by the consistent sharing of information and taking action based on that information.

Project Executing & Control

Project Tracking and Monitoring

Project Tracking and Monitoring

The management functions of tracking and monitoring are indispensable to the effective and efficient control of the project. In this methodology, tracking is defined as the fact-finding processes, and monitoring as the analysis of these facts. Both are needed for effective management of a project.

Control processes are established not to determine what has happened, but rather to predict what may happen in the future if the present conditions continue.

Each project team constantly compares planned and actual performances to answer the fundamental question:

How is the project doing?

Once a project has advanced to the execution phase, constant flow of consistent information on the true status of the project is essential to keeping the project on the road to success. This information is generally provided in the form of:

- Written status reports.
- Updates to the schedule, showing actual progress compared to the plan.
- Resource analysis comparing the actual resources assigned to the project against the plan.
- Financial analysis comparing actual costs versus planned costs.
- Issues/Action item log documenting issues, decisions and action items that may impact project performance, with due dates and status of each.
- Change Control log documenting all change requests with due dates and status.
- Project Review presentations for management and the Steering Committee, summarizing all of the above.

Most of the methods for acquiring information pertaining to the project come from the project team and from the processes used to keep the plan current. This section deals specifically with the elements of tracking and monitoring. The purpose is to track all four major project variables -- performance, time, scope and cost.

The recommendations contained in this document serve as the minimum set of planned elements that are to be tracked and monitored over the lifetime of the project. This list should be augmented and tailored for each specific project, based on its size and complexity.

Project Executing & Control

Project Tracking and Monitoring

The Project Plan as the Road Map and Baseline for Tracking and Monitoring

Risk management during project execution is addressed separately because of its particular importance. It should be noted, however, that accurate and timely tracking and monitoring are the basis for effective risk management.

The tracking process should start with the project plan. Even an imperfect project plan is useful because it can serve as a starting place.

The concept of a “perfect” plan is an illusion and not what determines project success. Plans are living documents that need to be updated continually to reflect project performance and changes in the project environment. However, project performance needs to be tracked and compared to a plan that has been approved by management and the stakeholders. This is called the baseline plan. A new baseline is usually established at the beginning of each phase of a project, or whenever a major re-planning effort is required due to changes in the project requirements or the project environment. New baselines must be reviewed and approved by management and the stakeholders. Tracking and monitoring are performed against the baseline.

The key elements in the project plan that are needed for tracking include:

- Scope of Work.
- Project Functional Specifications and other documents.
- Success factors.
- Work Breakdown Structure (WBS), activity network and activity descriptions.
- Master and detailed schedules, along with the assumptions on which they were based.
- Budgets and estimates, along with the assumptions on which they were based.
- Financial and funding plans.
- Quality, Configuration Management and Risk Management Plans.

What is to be Tracked

As a general rule of thumb, most tracking materials should be by-products of execution of the project. The level of detail about the project should decrease as the information is moved up through the project organization. “What is to be tracked and how” is a very important question and one not to be taken lightly. The project manager should first focus on putting in place the most critical parts of tracking and monitoring, and then add additional items to track as necessary.

Project Executing & Control

Project Tracking and Monitoring

When Should Tracking be Done?

The minimum tracking and monitoring components are:

- Schedule
- Cost
- Resource utilization and availability
- Scope
- Quality

For each of these it is necessary to track performance against the plan and forecast the final performance of the project.

The frequency of the tracking and monitoring activities will vary with the specific element and the amount of detail needed and should complement the management and technical review processes for the project. The frequency of tracking activities should be documented in the project charter, possibly summarized in a project tracking matrix.

A sample matrix for a project is provided on Figure 15-1. The matrix lists the actual tracking elements, the recommended frequency and some general tracking remarks. The use of a matrix provides a means to clearly communicate project tracking requirements.

Project Executing & Control

Project Tracking and Monitoring

Tracking Activity	Recommended Frequency	Remarks
Update Project Master Schedule	Monthly and for key Milestone or Phase Completion Reviews	<ul style="list-style-type: none"> GANTT chart preferred Baseline, actual & forecast
Update detailed work schedules	Weekly or biweekly for status reports	<ul style="list-style-type: none"> Task leaders are source
Update Estimate at Completion (EAC)	Monthly and whenever significant schedule or cost variances become visible.	<ul style="list-style-type: none"> Schedule Cost
Update Financial Status and planned versus actual spending profile	Monthly and for Management reviews and Steering Committee meetings.	<ul style="list-style-type: none"> Dollars encumbered and spent vs. budgeted
Update Staff Loading and Staff Availability	Monthly and for Management Reviews and Steering Committee meetings.	<ul style="list-style-type: none"> Are there unacceptable peaks and valleys? Identify/validate need for resources
Update Risk Identification	Quarterly as part of Risk Management	<ul style="list-style-type: none"> Update risk matrix Is risk mitigation required? Has a risk materialized?
Update WBS	As required when scope changes are approved or additional tasks identified.	<ul style="list-style-type: none"> When requirements change As plans evolve and become more detailed
Update Project Requirements	When change requests have been approved	<ul style="list-style-type: none"> Contract modification Change Control List for Details
Examine Quality Status vs. Plan	Quarterly and for Key Milestone or Phase Completion Reviews	<ul style="list-style-type: none"> Reviews completed Quality issues identified & recommended resolutions
Examine Configuration Status versus Plan	When configuration changes are identified and approved	<ul style="list-style-type: none"> Identify configuration changes
Update Issues and Action Items	Weekly for status meetings	<ul style="list-style-type: none"> Tracked until resolved

Project Tracking Matrix

Figure 15-1

Schedule Control

Requirements for successful Schedule Tracking and Monitoring

The project schedule can be monitored successfully only if:

- The definitions of the task, any deliverables produced by the task and “what is complete” are understood by the people involved.
- Every task on the WBS is included in the schedule with planned start and completion dates.
- Every task included in the schedule is on the WBS.
- The person responsible for every task is clearly identified.
- The task team participated enough in the planning process to be committed to the resulting schedule.

The schedule tracking process starts with the detailed tasks at the bottom of the WBS. The source of the data is the task leader. Assuming that the WBS is decomposed into tasks of 1-3 weeks duration, the task leader will have only a small number of activities active at any given time, and can track the above dates on a piece of paper or a small spreadsheet. Task leaders should report the status of all active tasks every week to the owner of the work package that is one level up in the WBS, or to the project manager, or to a designated project administrator. A project team may have one or more project administrators on a project team to maintain the schedule and cost information and to perform other administrative tasks. It is the project administrator’s task to put the schedule plan and performance information into a project scheduling tool such as Microsoft Project, and generate analytical reports for the project manager. **Lack of adequate staff assigned to this activity results in lack of clear and timely recognition of project status and problems.**

In order to facilitate the process, it is recommended that tasks be delegated in writing, stating the task deliverables, the planned dates, and the completion criteria. Completion criteria are important to avoid misunderstandings. For example, it is important to know whether a task producing a document is complete when a draft has been completed or when the document has been reviewed and approved. Lack of clear completion criteria often causes a supposedly completed task to be reopened. This will negatively impact the credibility of the project manager and the project team.

Schedule Status Reporting

Schedule status can be presented in two ways, on a Gantt chart or on a spreadsheet. The choice depends on the project manager, and how he or she can communicate most effectively with the stakeholders. Examples of both are shown below.

Schedule Control

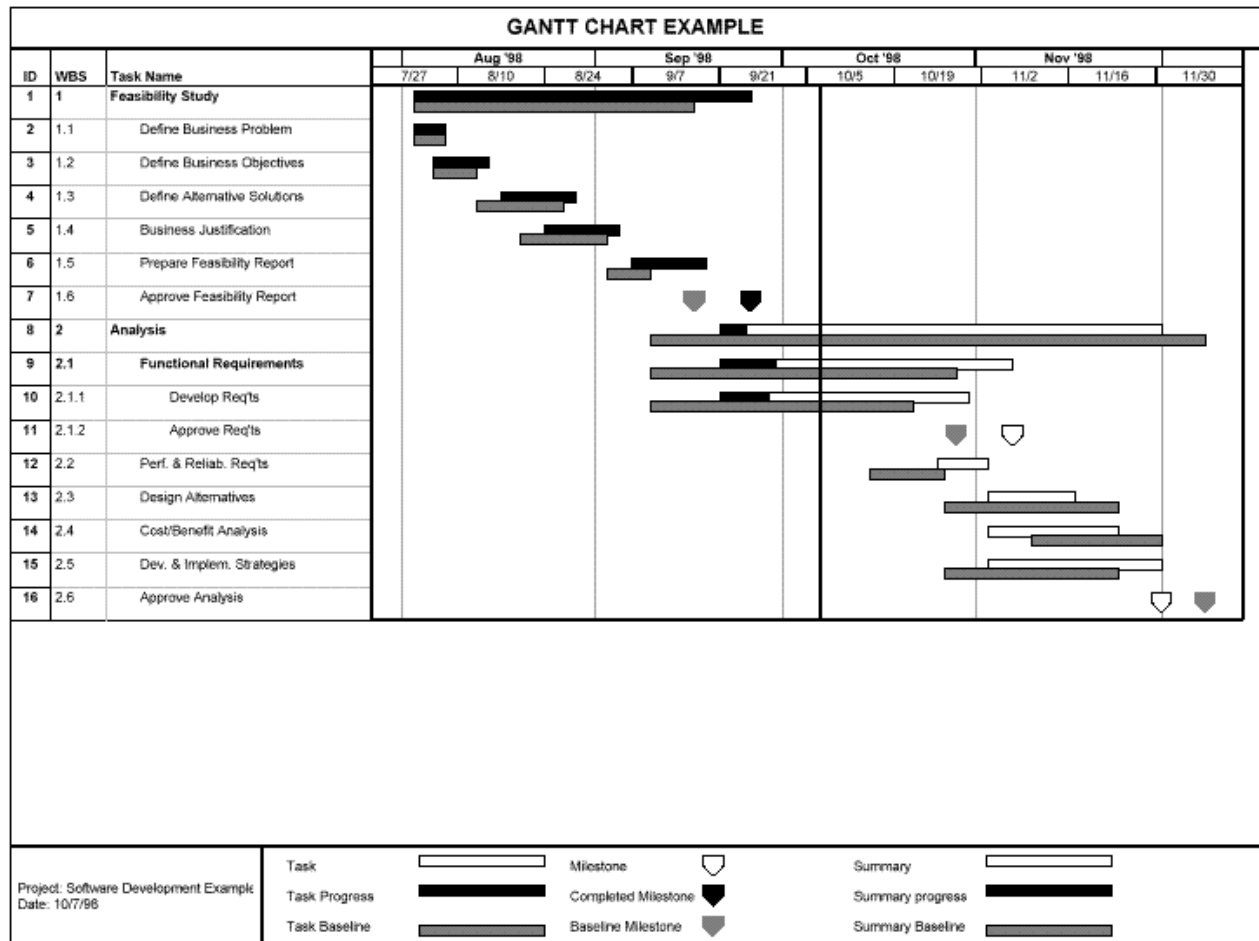
Gantt Chart

Figure 16-1 Gantt Chart Example

The Gantt chart above gives a pictorial view of the schedule status. It shows the original plan, i.e. the baseline (gray shaded bar), progress to date (black filled bar), and the current plan (open bar). Milestones are shown as “home-plate” markers in a similar manner. This is the recommended convention for the legend. On the chart the bars for bottom level tasks are deliberately put in the same form as for summary tasks. The reader can easily distinguish a summary task from a bottom level task by indentifying the WBS number in the second column. Status reports at the project level will contain mostly summary tasks. Consistent use of this standard convention for formatting Gantt charts will make it much easier for management participating in project reviews.

Schedule Control

Estimation of Percent Complete

In the example, progress was entered as the project manager's judgment of percent complete. The percent is not shown on the chart but is implied in the length of the black filled bar compared to the length of the total bar. The purpose of measuring progress is to provide a basis for predicting the future, that is, when the task and the project will be completed. It is important not only to update the planned completion date for a task that is behind schedule, but also to understand the impact this may have on other tasks and the overall project schedule. In the above example, the current date, October 7, is shown as a heavy vertical line. Any task where the progress bar is not filled in up to the current date appears to be behind schedule.

Estimation of percent complete is a subjective judgement and is often optimistic. The "90% complete for 90% of the time" syndrome is well known. The way to eliminate most of the subjectivity is to break the work down into tasks of 2-3 weeks duration so that the number of partially completed tasks (work-in-process) at the reporting deadline is minimized. Project performance then can be measured easily based on tasks that are 100% complete.

Gantt Chart Interpretation

A Gantt chart is only an indicator of project status. It raises questions that need to be answered by the project manager. The interpretation of the chart and any resulting actions or recommendations by the project manager are more important than the chart itself.

The example does illustrates some issues:

1. Some tasks are pushed later on the schedule because their preceeding tasks have been completed late. This is determined by the task dependencies that were entered in the plan. If those dependencies are not mandatory there is an opportunity, subject to resource availabilty, to remove dependencies and recover some of the potential slippage.
2. WBS tasks 2.2 and 2.3 show an attempt by the project manager to recover some of the schedule slippage. The current planned duration for these two tasks is less than that in the baseline plan. This might imply additional resources or more skilled resources assigned to these tasks, or just a re-assessment of the original estimates.

The major elements of schedule tracking and monitoring are:

- Compare current status to the plan.
- Analyze the reasons for schedule variances, whether they are within the range of normal estimating error; whether they are caused by lack of planned resources, insufficient number of people, or shortage of specially skilled individuals; whether the tasks are more complex than originally estimated, etc.
- Update estimates at completion early. It is meaningless to update the estimated completion date after the plan date has already passed. The earlier a potential slippage is recognized, the easier it may be to take corrective actions so that the project as a whole will stay on schedule, even if the specific task is late.
- Update and document the Gantt charts or spreadsheets. They are only indicators of status. They require interpretation by the project manager.

Schedule Control

Spreadsheet Format for Schedule Monitoring

The information on the Gantt chart in Figure 16.1 is displayed below on a spreadsheet.

WBS #	Task Name	Baseline Start Date	Current Plan or Act. Start Date	Baseline Finish Date	Current Plan Finish Date	Status or Required for completion
1	Feasibility Study	8/3/98	8/3/98	9/16/98	9/25/98	Needs Steering Comm. Approval
1.1	Define Business Problem	8/3/98	8/3/98	8/7/98	8/7/98	Completed
1.2	Define Business Objectives	8/6/98	8/6/98	8/12/98	8/14/98	Completed
1.3	Define Alternative Sol'ns	8/13/98	8/17/98	8/26/98	8/28/98	Completed
1.4	Business Justification	8/20/98	8/24/98	9/2/98	9/4/98	Completed
1.5	Prepare Feasibility Report	9/3/98	9/7/98	9/9/98	9/18/98	Completed
1.6	Approve Feasibility Report	9/16/98	9/25/98	9/16/98	9/25/98	In progress
2	Analysis	9/10/98	9/21/98	12/7/98	11/30/98	
2.1	Functional Requirements	9/10/98	9/21/98	10/28/98	11/6/98	
2.1.1	Develop Req'ts	9/10/98	9/21/98	10/21/98	10/30/98	
2.1.2	Approve Req'ts	10/28/98	11/6/98	10/28/98	11/6/98	
2.2	Perf. & Reliab. Req'ts	10/15/98	10/26/98	10/26/98	11/2/98	
2.3	Design Alternatives	10/27/98	11/3/98	11/23/98	11/16/98	
2.4	Cost/Benefit Analysis	11/10/98	11/3/98	11/30/98	11/23/98	
2.5	Dev. & Implem. Strategies	10/27/98	11/3/98	11/23/98	11/30/98	
2.6	Approve Analysis	12/7/98	11/30/98	12/7/98	11/30/98	

Schedule Status in Spreadsheet Format

Figure 16-2

The above spreadsheet contains the same data that are plotted on the Gantt chart. The Gantt chart gives a visual picture of schedule status. But some managers like the spreadsheet format better. For project review presentations the chart is preferable.

An advantage of the spreadsheet is that it provides space for status comments. Especially when a task is or has the potential to be late, it is important to identify what is needed to complete the task, such as reviews by specific individuals, installation of certain software, etc.

Some people like to have a percent complete column on the spreadsheet. This can be helpful if the WBS is not decomposed into short enough tasks so that task completions occur weekly. However, it is a very subjective measure of performance unless the task leader has some detailed backup, such as a checklist of more detailed tasks to support his/her estimate of percent complete. The recommended approach is to break work into small tasks of 2-3 weeks of duration and classify the tasks as "to be started" (0%), "in progress" (50%), and "completed" (100%).

Schedule Control

Earned Value as a Tool for Summarizing Schedule Status

It is often difficult to gauge how much a project is ahead of or behind schedule on either Gantt charts or spreadsheets. The reasons are two-fold:

1. Even if work is broken into 2-3 week tasks, the summary tasks that are shown on a project-level report have a longer duration. Progress at the summary level is then shown as percent complete, whether calculated by a scheduling tool or estimated by the project manager.
2. Usually some tasks on a project are on schedule, some ahead and some behind. It is difficult to integrate these into an overall status measurement.

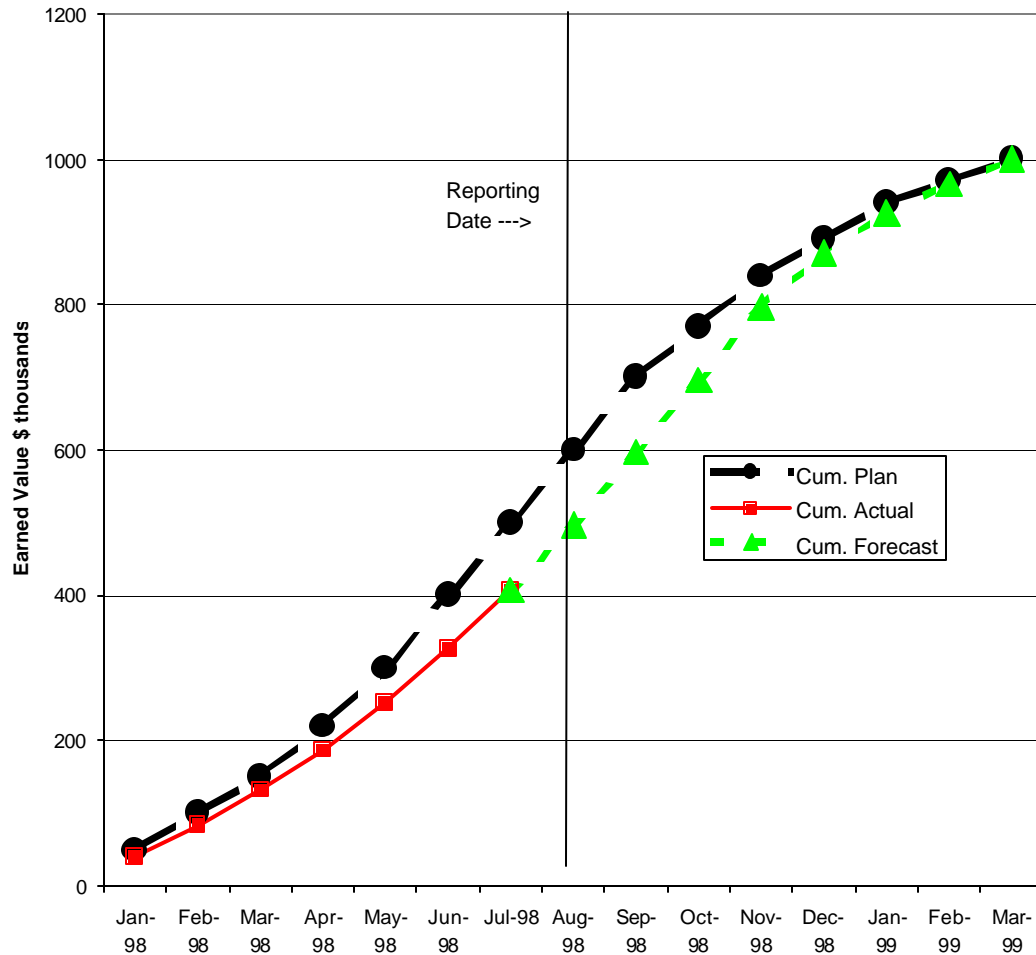
However, there is a concept called “earned value” that helps this integration, and provides an overall quantitative measure of how far ahead of schedule or behind schedule a project really is. Earned value is described with an example below.

Earned Value is based on the principle that every task has a value. The value can be expressed in terms of dollars or in terms of hours. The value is defined in the baseline plan by the hours or dollars required to complete the task.

Value is earned as tasks are completed. Thus an earned value plan can be created by accumulating the values of tasks at their scheduled completion dates. Actual earned value can be calculated at any point in time by accumulating the budgeted task values for all tasks that have actually been completed. The result can be plotted on a chart as shown below.

It should be noted that the earned value calculated as described above is a conservative estimate since it does not include values earned by partially finished tasks. If this approach causes significant problems in estimating future resource requirements, the project manager should override this approach by including in progress tasks based on their percent complete.

Schedule Control



Earned Value – Actual and Forecast Versus Plan
Figure 16-3

In the above chart “time-now” is the end of July, 1998. At this point in time the planned earned value is \$500,000 and the actual is \$407,000. The difference, called the “schedule variance”, is \$93,000. Since the average rate of expenditure on this project is \$67,000 per month, this project is about 1 1/2 months behind schedule. The chart also shows that the slippage will be made up by the end of the project, i.e. March 1999. The Project Manager needs to explain how this will be accomplished, whether through added staff or changes that will occur to prevent the current trend from continuing.

Schedule Control

A similar chart can be drawn in hours if dollars are not readily available. Assuming an average labor cost of \$75 per hour, the May schedule variance expressed in hours would be 1,600 hours, or about 1 person-year. This gives the project manager an idea of the magnitude of the additional resources that might be required to bring the project back on schedule.

Schedule Variance Analysis

Gantt charts, spreadsheets and earned value charts can provide indicators of the schedule status of a project. Even more important, however, is to understand the cause of any schedule variance and the potential impact on the overall project schedule. This will determine the nature of any required corrective actions. Typical reasons for schedule slippages are:

- Fewer resources are assigned than planned.
- There is a lack of resources with a critical skill.
- A less skilled or experienced resource is assigned than planned.
- Actual task scope is larger than planned.
- Task estimate was too aggressive.
- An administrative or approval process takes more elapsed time than assumed in the plan.
- Insufficient allowance for non-productive time, for example, sickness, vacation, training, administrative tasks not related to the project.

Depending on the reason for the slippage, the project manager may or may not be able to take corrective actions that will bring the project back on plan. The project manager may have to modify the plan with the appropriate review and approval of the stakeholders.

Schedule Control Summary

The important elements of schedule monitoring are:

- The purpose of monitoring status is to provide the basis for predicting when tasks and the whole project will be completed. The sooner potential problems are identified the easier it is to take corrective action to keep the project on track.
- Schedule Tracking compares current schedule status to the plan.
- Schedule monitoring involves interpreting schedule status, identifying the need for any corrective actions, and communicating this information to the appropriate stakeholders.
- It is very important to update estimates at completion as soon as it is apparent that the baseline schedule date will probably be missed. It is **not** adequate to update the estimated completion date after the planned completion date for a task that has already passed. The earlier a potential slippage is recognized, the easier it may be take corrective actions so that the project as a whole will stay on schedule, even if the specific task is late.
- The Gantt charts or spreadsheets are only indicators of status. They require interpretation by the project manager.
- Earned value is a good way of summarizing schedule status involving many tasks of different sizes and complexity, with some tasks being ahead of schedule, some on schedule and some behind schedule.

Resource Control

Resource Loading Updates

Updating the project resource plan is an important tracking event because shifts in this plan can cause performance, cost, and schedule problems. The staffing plan showing the number of personnel, by type, that were required on the project was developed as part of the planning process. As part of tracking, this information is compared monthly on a planned versus actual basis. Periodically, the project manager also validates whether these planned resources are still sufficient to complete the task on schedule and within budget given changing conditions.

Updating resource loading and staffing profiles, as shown below, helps the project manager adjust to these changing conditions by refining the estimated effort to complete the project, validating the continuing need for resources and identifying problems early in the project. By identifying and analyzing discrepancies, the project team can determine if adequate resources are being applied to the project and can get early indications that the project is falling behind schedule or is more complex than initially estimated.

1999 Resource Loading
Figure 17-1

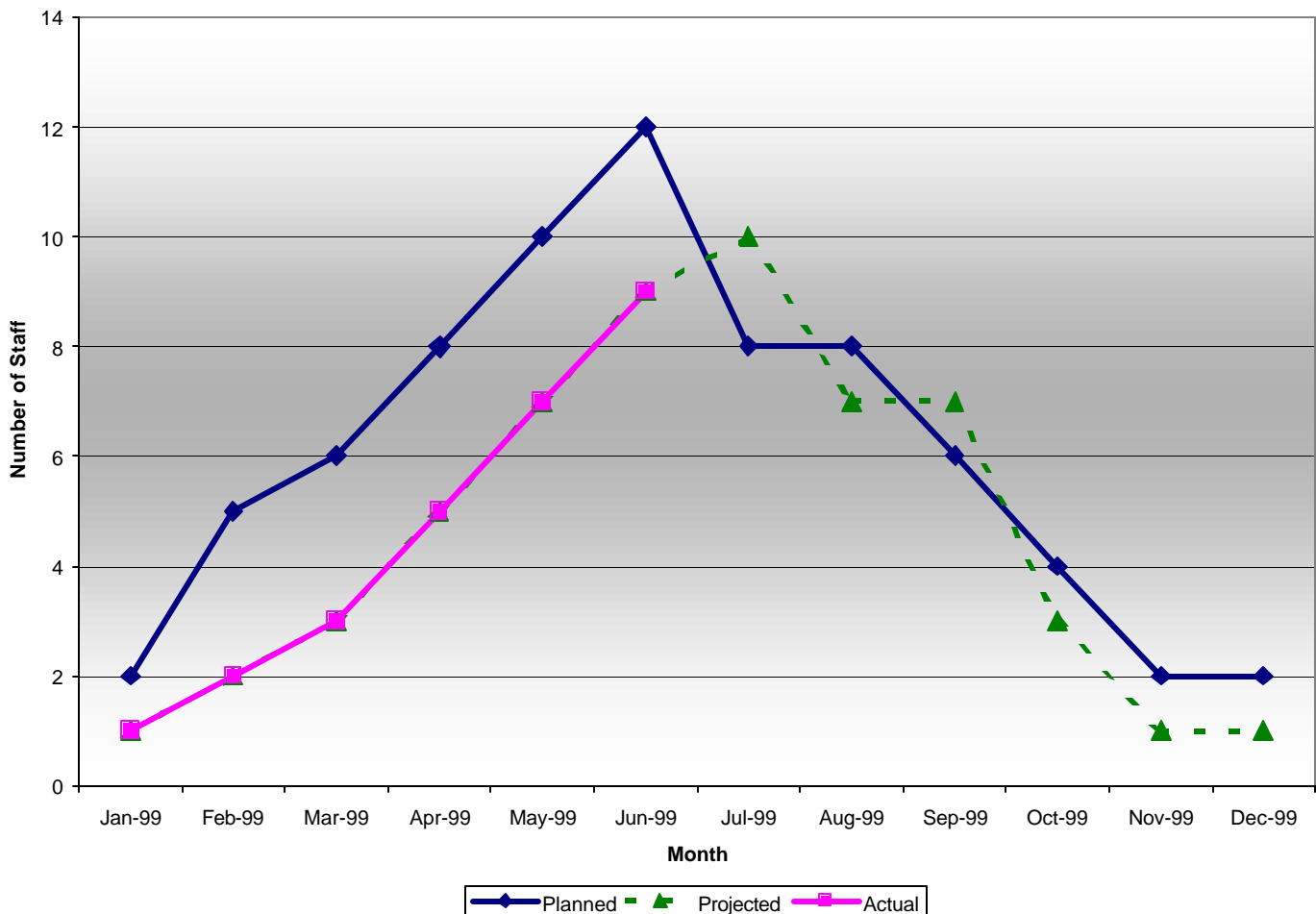
POSITION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SW Mgr	1	1	1	1	1	1	1	1	1	1	1	1
Sr. SW Eng.	1	1	1	1	1	1	1	1	1	1	1	1
SW Analyst	1	1	1	1	1	0.5	0.5	0.5	0.5	0.5	1	1
Programmer			2	2	3	3	3	3	3	3	3	2
Config. Mgr			0.5	1	1	1	1	1	1	1	1	1
Tech Writer	0.5	1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Support	0.25	0.5	0.5	1	1	0.25	0.25	0.25	0.25	0.25	1	0.5
PLANNED	3.75	4.5	7	8	8.5	7.25	7.25	7.25	7.25	7.25	8.5	7
POSITION	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SW Mgr	1	1	1									
Sr. SW Eng.	1	1	1									
SW Analyst	1	1	1									
Programmer			2									
Config Mgr			1									
Tech Writer	0.5	1	1									
Support	0.25	0.25	0.5									

Resource Control

ACTUAL	3.75	4.25	7.5	0	0	0	0	0	0	0	0	0
--------	------	------	-----	---	---	---	---	---	---	---	---	---

The staffing information can also be graphically presented on a timeline with actuals compared to planned and forecast in the example showed below.

Staffing Profile
Figure 17-2

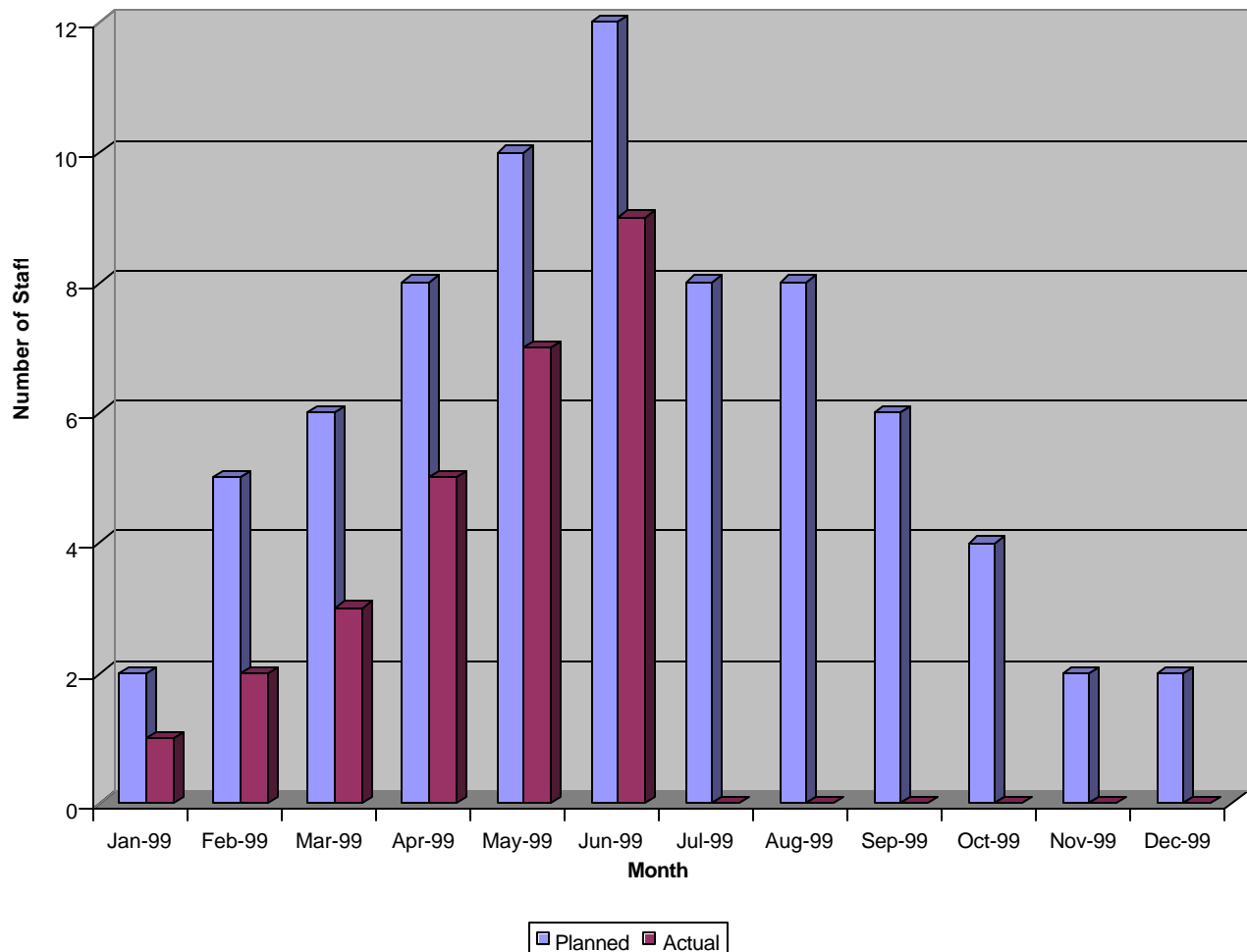


Resource Control

Lastly, this information can also be represented in a bar chart as shown in Figure 17-3 so that monthly can be tracked as opposed to trends.

Staffing Profile Actual versus Planned

Figure 17-3



Cost Control

Cost Control Overview

Costs also must be tracked and monitored against the plan. There are two levels of tracking and monitoring costs. At the top level, costs must be tracked against the approved budget by department and funding source. At this level, costs should be tracked for the project as a whole, for major phases to the extent they are budgeted or funded separately, and for major deliverables.

At the detail level, costs should be tracked and monitored by WBS item. This requires collection of City labor hours and other costs by WBS item. This level of cost management and control will be addressed in a later release of this methodology.

The most important part of cost monitoring is the interpretation of the current status and the resulting forecast of “cost-at-completion”. The first rule of good management is to “minimize surprises”. As with schedule and resource variances, it is important to recognize problems early when corrective actions are easier. The credibility of the project manager is highly dependent on this factor.

Cost Elements to be Tracked

The following cost elements should be considered in setting up cost reporting for a project. Precise reporting formats may vary from project to project depending on the size and type of the project, whether performed in-house or using a systems integration contractor, whether funded in annual department expense budgets or by special funds such as a bond issue, etc.

1. Total costs by department versus approved budgets
 - By fiscal year, with month and YTD for the current fiscal year
 - Inception-to-date with estimate at completion
 - By major account, e.g. salaries, equipment, outside services, etc.
 - By funding source, e.g. expense budget, MICLA, etc.
 - By major deliverable using the “Work Order” capability of the City’s FMIS system.
2. For major contracts:
 - Inception-to-date expenses versus total encumbered
 - Monthly expenses versus monthly payment plans. The monthly payment plan may be based on completion and acceptance of specific contractual deliverables. The meaning and significance of variances are dependent on the payment basis.

Cost Control

Sample Report Formats

Reports may be in graphical or tabular formats. Simple graphs are usually a good way to communicate overall status to upper management and Steering Committees. However, spreadsheets often contain the backup information needed to answer questions.

Figure 18-1 is a simple chart showing monthly project costs versus the plan, together with a forecast for the remainder of the project.

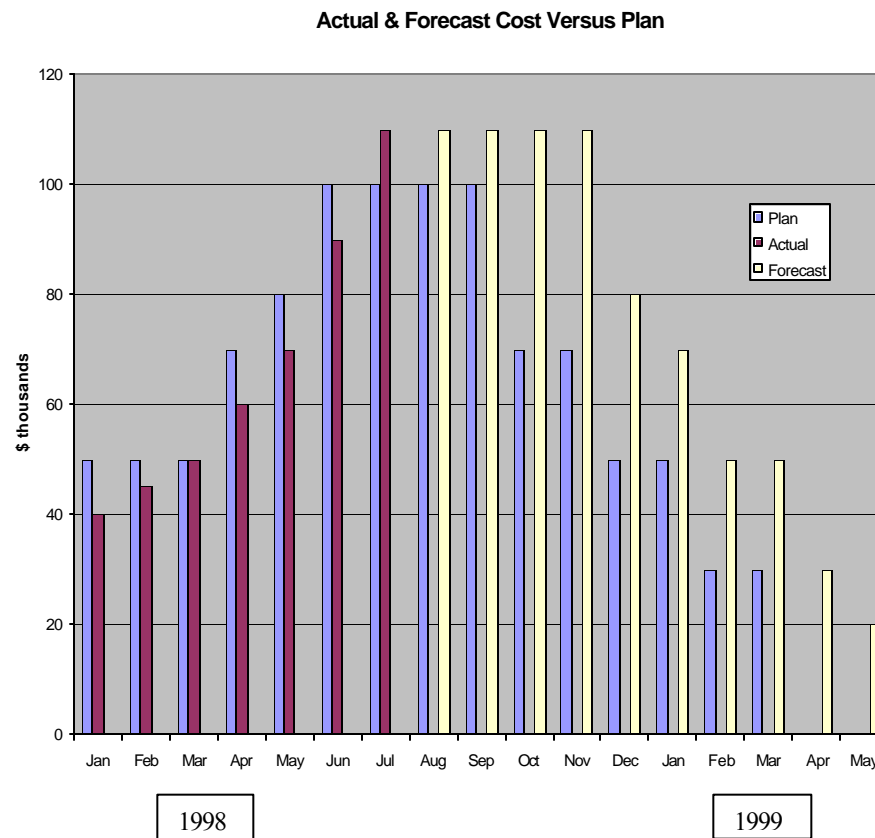


Figure 18-1

This monthly chart shows how the cost buildup on this project was slower than originally planned, that the peak “burn rate” in July through November is higher than planned (probably to make up for lost time), and that the estimated completion date is extended by two months. This provides a useful picture of the pattern of the project.

Cost Control

The chart in Figure 18-2 shows cumulative costs from the start of the project (or it could be start of a phase) and the estimated cost at completion.

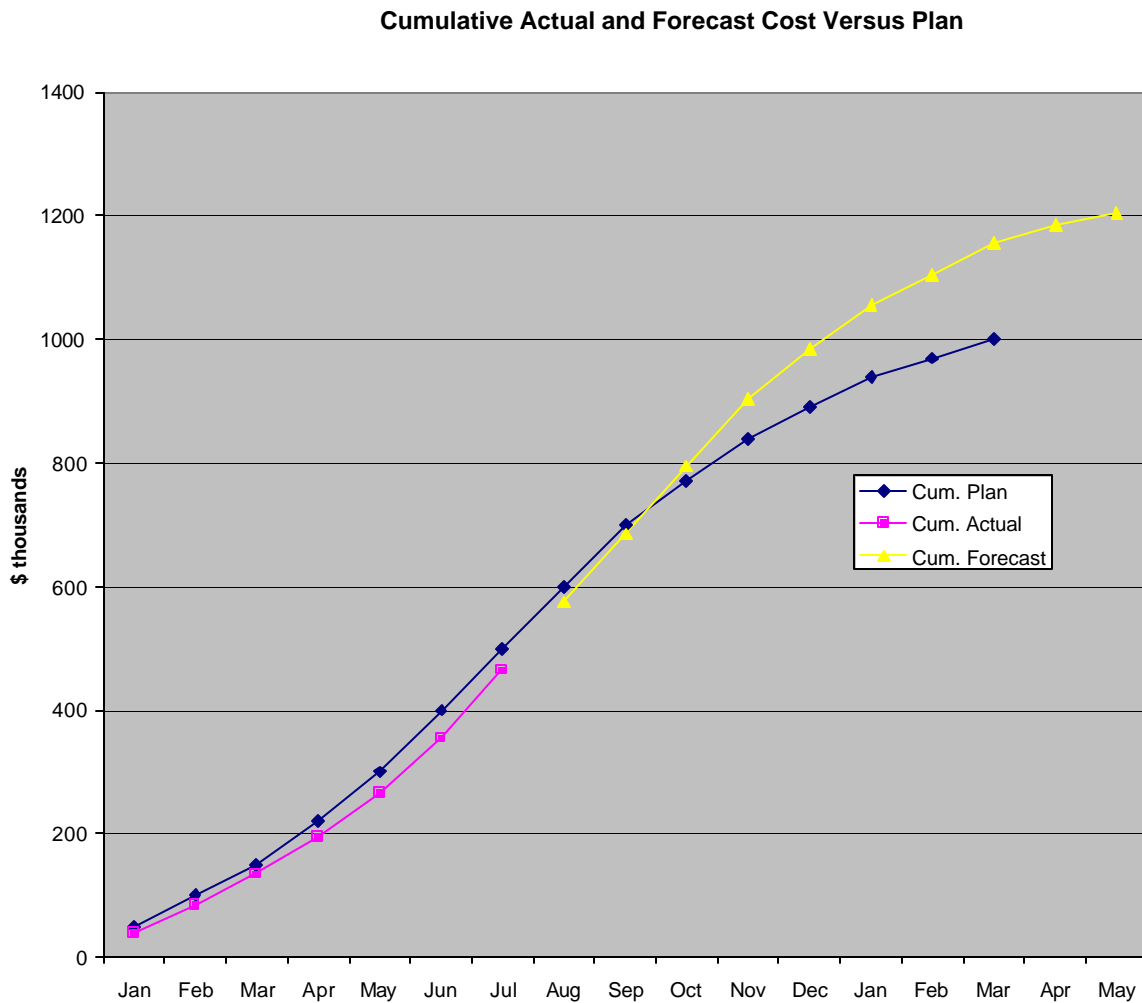


Figure 18-2

The above cumulative cost chart shows status at the end of the project more clearly than the monthly chart, but does not show the monthly pattern as well.

The selection of the most relevant charts and spreadsheets to be produced for a project should be determined in the Project Status Reporting.

Cost Control

Cost Variance Analysis

The most important part of cost monitoring is understanding and communicating the reasons for cost variances and the potential impact on the project at completion. At any point in time on a project the actual cost may vary from the planned cost for two reasons:

1. The resource requirements and therefore costs of tasks that have been completed are different from the planned resources and costs for the completed tasks. This is called the cost variance.
2. The inception-to-date costs for the project may be different from the planned. The project manager should carefully investigate the causes of the differences before making any general conclusions. In some cases, the differences may be because of less work being accomplished rather than fewer resources required to do the scheduled work. Conversely, actual inception-to-date costs may be greater than the planned inception-to-date costs not because there is a cost over-run, but because more resources were applied to accomplish work ahead of the schedule. These are both examples of the schedule variance that was described earlier in the chapter on Schedule Control.

The ability to separate the overall cost variance at any point in time into schedule and cost components is highly dependent on the level of detail in the plan and the level of detail at which actual labor hours and costs are collected. Unless the WBS is decomposed into tasks of 1 to 3 weeks duration, it is very hard to determine cost and schedule variances objectively. Earned value is a helpful tool that can be used to estimate these variances.

Finally, separating overall expenditure variances into schedule and cost components only categorizes the variances but does not provide the underlying reasons for them. An important function of the Project Manager is to explain the “why”. Possible explanations include:

- Tasks are more complex than originally understood.
- Estimates are too aggressive at the start of the project.
- Different, more or less experienced resources are assigned than planned
- Requirements are incomplete in the initial plan.
- There are unexpected level of staff illness and/or turnover.

Project Executing & Control

Project Status Reporting

Project Status Reporting Overview

Project Status Reporting consists of both formal and informal project reporting and review processes. This chapter provides recommendations for:

- Task level status reporting.
- Project level status reporting.
- Different kinds of project status reviews tailored to different audiences.

Information generated during the tracking and monitoring process forms the basis for reaching a judgment about the project status and whether corrective actions are required. The project status reports and project reviews are the mechanisms for summarizing and sharing this information with the stakeholders, including the team members. They address the following specific questions:

- What is the status of each of the activities?
- Where is the project compared to the planned schedule, cost, and technical performance?
- **And most importantly**, how does the current status affect future project performance?

Written project status reports should be prepared for the project as a whole and for the individual tasks that make up the project.

Task Level Status Reporting

At the individual task level, reporting should be brief and restricted to tasks that are or should be currently active. There are two ways of collecting the information outlined in Figure 19-1. Task leaders can be required to submit written reports on a weekly or biweekly basis. The information can also be captured in weekly or biweekly project status reviews. Regardless of the method of collecting the information, the project manager needs to have the information in order to understand the status of the project and make any necessary adjustments to the plan.

The sample report in Figure 19-1 has two sections. The first section allows the task leader to describe what has been accomplished and what will be accomplished in the next reporting period. **The focus is on accomplishments not activities.** This section also encourages the task leader to document problems, issues and any critical dependencies that could affect task completion, such as, waiting for a management decision. It is critical that the team members report problems, issues and bottlenecks promptly to the project leaders and sponsors. **The sooner a problem is known the easier and less costly it is to fix.**

The second section of Figure 19-1 is formal reporting of task status and outlook of task completion. The tasks shown on this report should be restricted to tasks that are or should be active to meet the scheduled due dates.

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Initial Release	1.0
Date:	09/05/2001

Project Executing & Control

Project Status Reporting

WEEKLY PROGRESS REPORT

PROJECT: _____	TASK: _____
----------------	-------------

To:	Week Ending:
Prepared By:	
Work Completed – Current Period:	
Work Planned for Completion – Next Period:	
Analysis of Variances from the plan, including Issues/Problems/Concerns:	
Management Actions Recommended:	

Due Date:	% Complete:	Forecasted Completion Date:
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Figure 19-1

Project Executing & Control

Project Status Reporting

Project Level Status Reporting

For the whole project and major sub-projects status reporting is more complex. The audience for project level status reports consists of the major stakeholders and in particular, the Project Sponsor and the Steering Committee. The recommended outline for a project status report is shown below. It is important not to overburden the management and the stakeholders with too much reporting. On the other hand, it is equally important that the project status and the outlook be communicated accurately, concisely and on a timely basis.

The frequency of Project Status Reports should be determined during the development of the Project Charter, and be dependent on the needs of the Project Sponsor, the Executive Steering Committee, and the Project Manager. Monthly reports are common practice. For critical projects with very tight schedules biweekly reports may be required.

Recommended Project Status Report Contents

1. A brief summary of the project and the current phase (1–2 paragraphs) to orient the reader.
2. Significant accomplishments during the current period and the timing of these accomplishments relative to the plan (1/2 – 1 page).
3. The Project Manager's assessment of current status and plan versus the baseline plan including:
 - Analysis of significant schedule or cost variances from the plan.
 - Impact of variances on project completion schedule or cost. Forecasting this impact is the most critical part of project reporting.
 - Corrective actions taken or recommended.
 - All significant issues requiring management attention, support or decisions.
 - Key accomplishments scheduled for the next reporting period.
4. A one page Gantt chart summary showing the project status at the master schedule level as shown in Figure 19-2.
5. A detailed Gantt chart showing project schedule performance for the next 3 or 4 months. This chart should show the baseline plan, progress to date and the current forecast to completion. A sample is shown in Figure 19-3.

Project Executing & Control

Project Status Reporting

Master Schedule Status

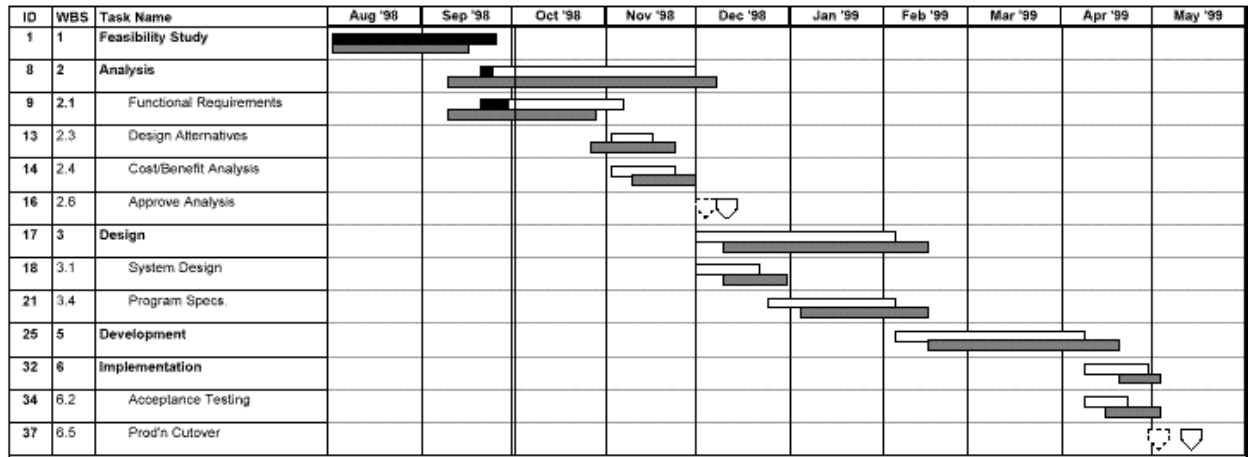


Figure 19-2

Current Phase Detailed Schedule Status

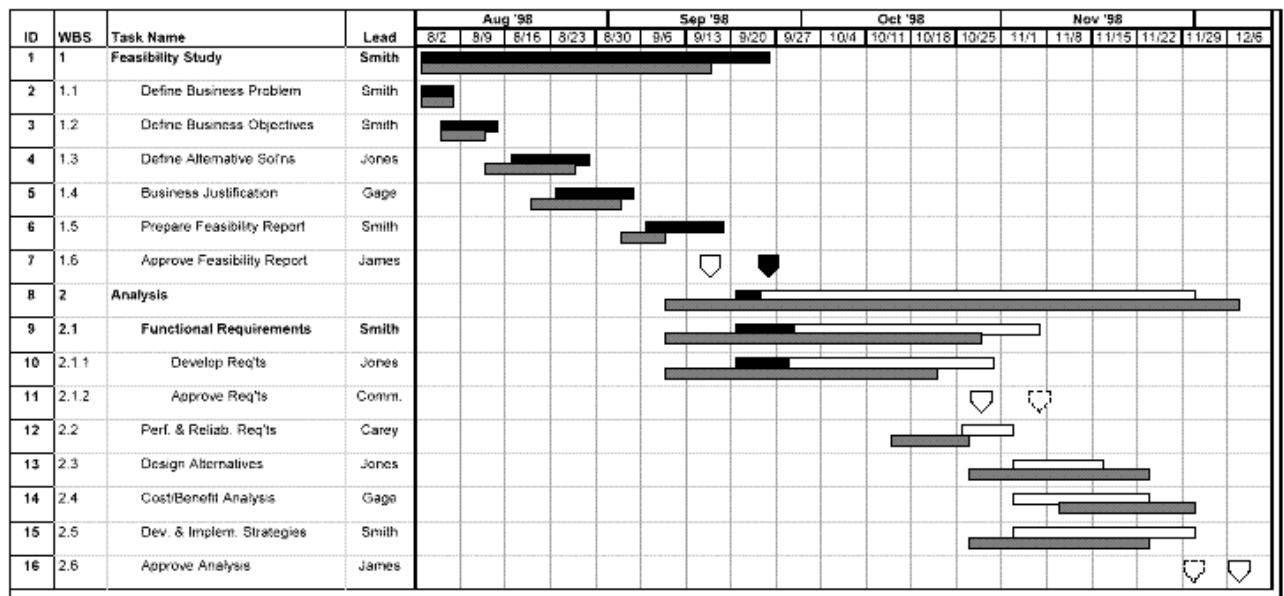


Figure 19-3

In the above samples, baselines are shown in gray color, current plans are in white, and progresses are in black.

Project Executing & Control

Project Status Reporting

6. An earned value chart showing actual and forecast versus the baseline plan as discussed in Chapter 16: Schedule Control. A sample is shown in figure 19-4.

Earned Value – Actual and Forecast versus Planned

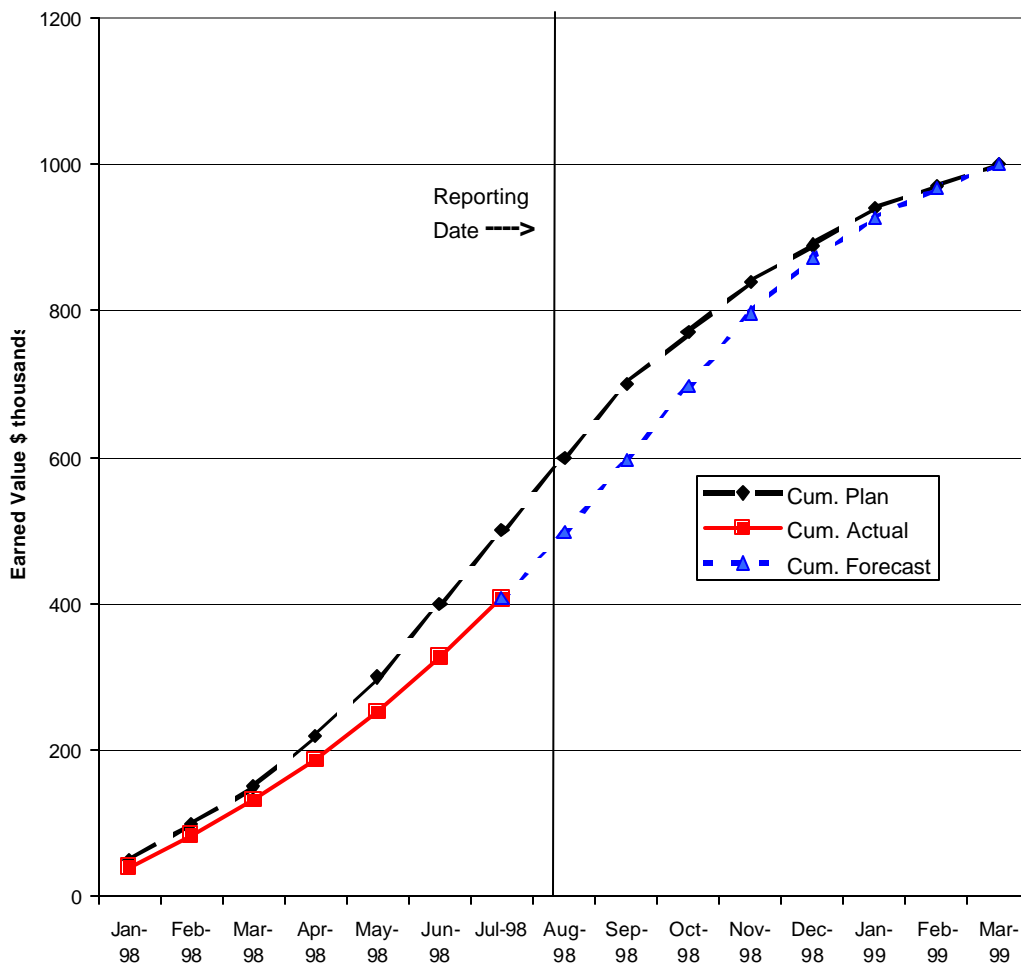


Figure 19-4

On this earned value chart, the project is shown as behind schedule, but will still be completed on time. The actions that make this catchup possible should be explained by the Project Manager in the Project Status Report.

Project Executing & Control

Project Status Reporting

7. A staffing chart showing actual and forecasted staffing levels versus the baseline plan as discussed in Chapter 17: Resource Control. A sample is shown in Figure 19-5.

Staffing Profile

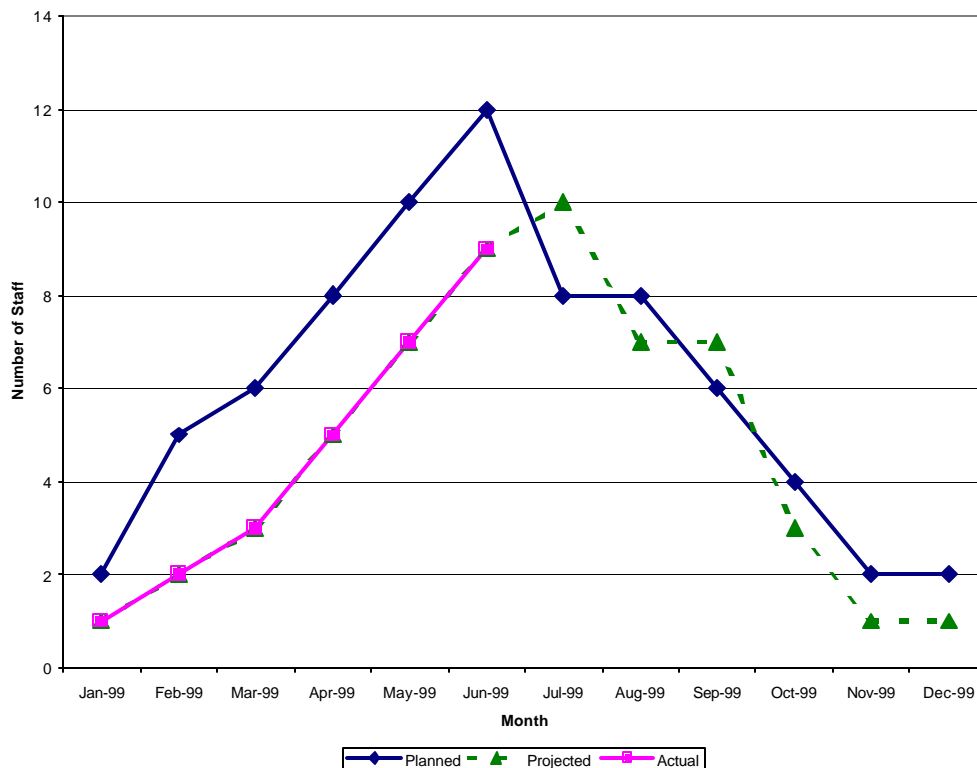


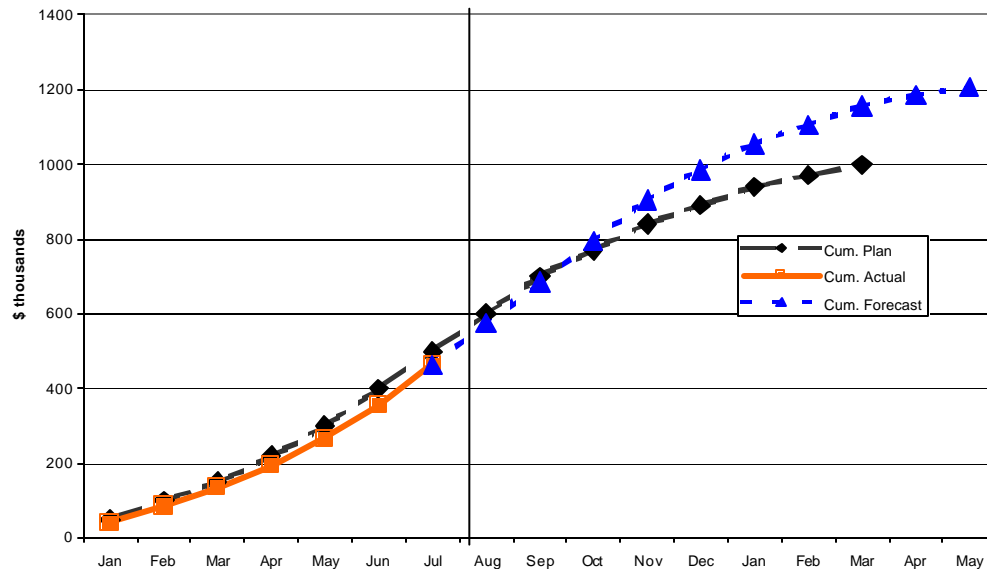
Figure 19-5

This example shows actual staffing that does not meet the planned needs. The Project Manager should explain in the Project Status Report whether the based plan was overestimated or staff had to work overtime to catch up with the project schedule.

Project Executing & Control

Project Status Reporting

8. A financial chart (monthly or quarterly only) as described in Chapter 18: Cost Control. A sample is shown in Figure 19-6.



Cumulative Costs - Actual & Forecast versus Plan

Figure 19-6

The above chart depicts a project that looks good on actual costs to July. But the forecast shows an expected schedule slippage and associated cost overrun. The project manager needs to explain the cause of the problem, and what, if anything can be done to correct the situation.

9. When in the test phase of a project, a summary chart showing problems found, severity, and status of fixes.
10. A Change Control log listing approved changes and outstanding change requests with their status.
11. An issues/action items log listing major outstanding issues and action items requiring management attention, responsible people/departments, and due dates for decision or resolution.

Project Executing & Control

Project Status Reporting

Project Review Meetings

Just as tracking and monitoring are critical to controlling a project, so too is reviewing. One of the major causes of a project getting off track is the lack of attention to formal reviews and informal assessment.

The focus of project reviews is on communication within the project team and the stakeholders. While tracking and monitoring focus on the process of measuring actual project performance against the baseline, reviewing focuses on sharing that information with the interested parties.

As in all other areas of project management, the review process needs to be tailored to the specific situation of the project. There is no single right formula for determining the type and frequency of project reviews. However, there are some recommended activities that should be performed, such as:

Team Project Status Review Meetings

The purpose of these meetings is to ensure that all team leaders and members understand the overall status of the project, and the relationship of their tasks to the tasks of other team members. The key to successful status meetings is that they be non-threatening so that team members feel free to raise issues and discuss their dependencies on others in a non-critical environment.

The emphasis of the status meeting is consistency and structure. The project team should know that this meeting is not “optional.” For this reason, it is recommended that status meetings occur weekly or biweekly throughout the project life cycle. Meeting more frequently is disruptive and does not allow the project team to focus on other tasks. Meeting less frequently will allow issues to go unresolved. Most project managers hold the project status meeting on the same day, at the same time, and at the same place every week or two weeks so that the meeting will become a part of the team members’ regular schedule. Consistent meetings also drive a discipline into the project organization. Another suggestion is that the meeting time should be on Tuesday, Wednesday or Thursday to avoid Mondays and Fridays, because these days are frequently taken off and generally produce rescheduling issues.

Considerations for Team Project Status Review Meetings

Attendees should be specially selected and limited to a relatively small number. They should include individuals who can provide status information and contribute to discussion on project issues. As a guideline, if the project team is small, then the full project team may attend. If the size of the project team ranges from 10 to 24, then only lead team members (planning, development, test, quality, etc.) should attend. For projects involving more than 25 members, attendees should be the team leaders and the key technical staff. Each member should have at least one or two backups.

Project status meetings need a controlled agenda in order to limit their length. They should not be used to solve technical problems. Instead problems should be identified and the resolution process and responsibilities determined and documented on an action item log. The log should identify the action item, the person responsible and the due date. Action item status should be reviewed at each meeting.

Project Executing & Control

Project Status Reporting

Preparation for the status review meeting is critical. Participants should present a formal report on current status of their assigned areas, analyze variances, communicate dependencies on other teams, and identify risks and other issues that need to be addressed. The focus of the weekly team meetings will likely be on schedule status, whereas the Executive and Steering Committee reviews will include resources and financial issues.

Once again, **the focus of project reviews is on sharing and communication of project information.** This requires an open atmosphere that invites participants to discuss problems freely and does not “punish the messenger”. The project manager must organize and manage the meetings in the way that encourages communication and discourages criticism. This does not mean avoiding asking difficult questions but rather asking the questions in a non-critical, constructive manner.

Ground Rules for Project Status Meeting

A large percentage of project time is spent in meetings of one form or another. Therefore, standard meeting management principles should be applied to maximize meeting productivity and effectiveness. In general, all attendees should:

- Come on time;
- Come prepared;
- Bring handouts; information should not just be in the attendee's head.
- Summarize the information; avoid reading it.

Since a project manager is responsible for reporting on the project's status to other levels of the organization, written materials are needed to complete the necessary reports.

If an activity is not on schedule, then the status meeting attendees should address:

- Why the activity is late or early.
- What other areas are/might be affected.
- What actions, if any, need to be taken?

Executive Management and Steering Committee Reviews

These should be held as needed, usually monthly or at least quarterly, and at the beginning and end of project phases. The goal is to facilitate open communication between executive management, the major stakeholders and the project manager/team. At these meetings, project progress should be assessed against the project plan, which provides a comprehensive “road map” to achieving the objectives of the project. Major issues include whether the project has reached the major milestones on time, review and approval of the major deliverables, resolving high-level resource conflicts, etc.

Executive management and Steering Committee project reviews should include formal presentations of the project status and of the charts described above in the paragraphs on project status reports. The purpose of the review should be to inform the stakeholders, obtain a consensus for major decisions that impact the stakeholders, and to enlist their support when needed.

Project Executing & Control

Project Status Reporting

Project Meeting Agenda Sample

PROJECT NAME

Status Meeting Agenda

Meeting Date: April 6, 1999 (Tuesday)		Meeting Time: 2:00 pm to 3:30 pm Total Time 1.5 Hours	
Meeting Location: Main Conference Room		Attachments: None	
Leader: B. Ngo (Project Manager) M. Erdei (Alternate)		Note Taker: R. Green	
Attendees: G. Dexter M. Erdei R. Green M. Le	C. Li L. Nishinaga B. Ngo	Please Bring: 1. Project Status Gantt and Resource Charts 2. Analysis of any schedule and cost variances 3. All outstanding project issues and change requests, or new risk elements 4. Standard project status report and attachments.	

Purpose of Meeting: The purpose of the Project Status Meeting is to coordinate the schedule, resource, and financial needs of each project group. The objective is to receive and share data, and to make group decisions critical to analyzing the project performance. Areas of prime interest are the schedule, technical and financial issues of each group and how they work together within the overall project structure.

Process for Meeting: It is expected that each person will update their status report from the previous reporting period and to discuss key issues and recommendations. Key areas are schedules, new accomplishments and planned accomplishments for the next period, resource issues, change elements, and other topics that require discussion.

Agenda Item	To Be Accomplished	Person Responsible	Time Allotted
Project overview	Notification and discussion	B. Ngo	05 Min.
Schedule overview	Notification and discussion	M. Erdei	10 Min.
Financial overview	Notification and discussion	C. Li	10 Min.
Technical overview	Notification and discussion	L. Nishinaga	10 Min.
Issue list review	Update	M. Le	10 Min.
Other issue	As defined by presenter	G. Dexter	10 Min.
Close	Summary	B. Ngo	05 Min.

Project Executing & Control

Project Status Reporting

Figure 19-7

Meeting Minutes

Good documentation of the results of all meetings, including status reviews, is very important. The minutes of review meetings should be a summary of the project status and important conclusions and decisions that were made or announced at the meeting. The minutes should also include an issues/action item log that lists each issue/action item, who is responsible for taking the action, and the due date. It is important not to duplicate on the action item log the tasks that are already on the project plan. Action items will tend to be actions required for resolving open issues.

Meeting minutes should **NOT** document what each person says as this inhibits open communication. If all discussion is documented then people feel less free to raise issues, and must review the meeting minutes to ensure they are not misquoted. This defeats the purpose of the meeting.

Other project reviews

There are other kinds of project reviews that are not specifically part of formal project reporting and are not described in this methodology. These include technical reviews, independent quality assurance reviews, and periodic team morale building/maintaining meetings.

Informal Review Processes

The informal reviews are the processes that the project manager and key project staff set up to measure the “atmosphere” of the project.

The management can gather information by walking the halls, visiting teamwork areas and inviting a key developer for coffee. The purpose is to get input from the project team, stakeholders, and executive management beyond just what is presented in the formal reviews. A set format sometimes limits the open exchange of information. For example, by talking with one team member, the manager might discover that a key technical staff member is very unhappy about some decisions on the project. This unhappiness might escalate to the point where a person would leave the project, and/or it could develop into a major problem. It is most important to develop personal relationships with as many of the team’s members as possible. At a minimum, this needs to be accomplished with key project members. Project members must feel comfortable sharing issues that are impacting progress and/or causing unrest/unhappiness that in turn impacts progress.

Part of the project manager’s responsibility is collecting informal information and interjecting it into the formal processes, where it can then be analyzed to determine if actions are required.

Lastly, the way a project is organized will drive the way the project is reviewed. Each key project activity needs to be tracked and reviewed as such, and the person or group responsible for the activities will need to provide input to the control process.

Contract Administration

Contract Administration Overview

This chapter addresses the preparation and administration of large IT systems development/integration contracts. Contract Administration encompasses the preparation, ongoing management and closing of a contract once a vendor has been selected according to the process outlined in Chapter 9. Without effective contract administration, performance of a potentially good vendor may deteriorate, budget and schedule targets may be missed, and a project may eventually fail. This chapter addresses the following major topics:

- **Developing and Maintaining a Successful Vendor Relationship;**
- **Preparing the Contract for an IT Systems Development/Integration Project;**
The general format of an IT contract and the major items that need to be included in it. The chapter does not address the negotiation process, only the typical contents of the contract.
- **Monitoring and Controlling Contract Progress;**
Tools that can be used for monitoring and controlling contract performance and how to evaluate vendor performance.
- **Achieving High Performance;**
Motivating a vendor to achieve high performance. Effective ways to reward superior performance of a vendor, and appropriate ways to handle poor performance.
- **Resolving Disputes;**
General guidelines for resolving contract disputes.

Developing and Maintaining a Successful Vendor Relationship

The success of large IT projects depends on a partnership relationship with the key vendors. The relationship with vendors should not be viewed as a zero-sum game. Although a win-win relationship may not be possible in all situations and on all issues, it is the ideal for which all parties involved should strive.

The foundation for a win-win relationship is good understanding and alignment of the objectives of both parties. Clear project scope and requirements are essential to a good vendor relationship. Unclear requirements that only become clarified as a project progresses can lead to an adversarial relationship with a vendor unless provision has been made ahead of time for dealing with these uncertainties.

Type of Contract and Impact on Vendor Relationships

Fixed price contracts are not always conducive to good alignment of City and vendor objectives. This is particularly true when the detailed requirements have not been completely specified, resulting in many issues coming up later relating to “what is within the contract scope versus what is a change in scope”. The more vague the requirements the more likely that the profit motive of the vendor will conflict with the City’s desire to obtain the most functionality and performance for the money. There are several approaches to minimize the risk of such conflicts:

1. Make sure the vendor has an adequate understanding of the project requirements and the City processes involved. A low bid may be due to lack of vendor understanding of the real project scope. Accepting such a low bid can lead to serious problems and to project failure.

Contract Administration

2. Include performance incentives in the contract. Other government agencies make extensive use of incentives based on meeting project schedule and cost targets. Another kind of incentive is based on the performance of the product or system after it is implemented. The State of California Franchise Tax Board has utilized incentives based on a share of the additional revenue generated by a new system. Other possibilities include a share of the cost savings generated or a per transaction fee. Such contracts tend to align the objectives of the City and the vendor to deliver the required product on time and within budget.
3. If the definition of requirements is one of the contract tasks, include in the contract some flexibility to renegotiate project scope and price at the end of the requirements phase. Recognize that a key objective of the requirements phase is to distinguish between “must have” and “nice to have” requirements and to perform the tradeoffs of functionality and performance versus cost and schedule.
4. Spend extra time up front working with a few pre-qualified vendors to develop requirements and to understand alternative conceptual solutions. The State of California Franchise Tax Board has accomplished this, while meeting the legal requirements for fair and equal treatment of all vendors. Their process is described in a document entitled “Performance Based Procurement” that is accessible on the internet at <http://www.ftb.ca.gov>. Requests For Information (RFIs) are also a tool that can help identify potential vendors and learn about alternative technologies and implementation approaches.
5. Recognize that the vendor will not perform as needed if doing so will result in inadequate profit or, especially, a financial loss.

The keys to maintaining a good vendor relationship are:

Maintaining a Good Vendor Relationship

1. Enforce contract terms consistently from day one. It’s too late to enforce contract terms only when problems start to surface, as the contractor can then claim previous implied waiver of the contract terms.
2. Make sure that City lives up to all contractual obligations, in particular, staffing, timeframe for approval of deliverables and other management decisions.
3. Insist on good and complete project status reporting so that problems, should they occur, become visible early when they can be fixed at the lowest cost.
4. Maintain tight configuration management and change control to avoid uncontrolled scope creep.
5. Act in good faith in resolving issues such as “this was implied in the requirements versus this is a new requirement”.
6. Remember that project success requires a win-win situation

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Preparing the Contract for an IT Project

The success of a major project that includes significant participation by vendors is highly dependent on having a win-win relationship with the vendor(s) as discussed above. The first step in the establishment of such a relationship is a good contract. A good contract is one that clearly defines:

- vendor responsibilities and deliverables;
- the City's roles and responsibilities;
- meaningful criteria and a timely process for accepting or rejecting deliverables;
- a realistic timeframe;
- a change management process;
- a payment schedule, preferably one that provides incentives for successful completion of the project;
- reasonable terms and conditions that are equitable to both parties;
- a dispute resolution process to resolve issues as they come up.

It is not possible to write a perfect contract that covers all possible situations and contingencies. A successful contract defines the groundrules for a partnership well enough so that progress and the quality of deliverables are measurable. However, success still depends on good faith between the parties

Contents of a Typical IT Contract

The major sections of a typical IT Systems Development/Integration contract are:

- I. Purpose and Scope of the Contract
- II. Project Management Organization and Responsibilities
- III. Key Assumptions and Constraints
- IV. Statement of Work
- V. Work Plan
- VI. Functional and Technical Requirements
- VII. Price and Payment Terms
- VIII. Terms and Conditions

The general contents of these sections are described below. Specific examples of contract tables of contents are included in the Templates and Examples section of this methodology. The examples are not all organized in the sequence described here, but do contain all of the basic content.

Many of the elements of the contract are similar to the elements of Scope Planning and Scope Definition, that are described in more detail in Chapters 4 and 5 of this methodology.

Contract Administration

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|---|--|
| I. Purpose and Scope of the Contract | This section defines the parties to the contract and the basic reason for the contract with phrases such as, “Whereas the City has a need for assistance in developing and implementing a City-wide XXXXX system”. This section also defines the role of the contractor in the broadest terms such as, prime contractor, system integrator, etc. This section also summarizes the objectives of the project and the functional, organizational and geographical scope. Reference can be made to similar and more detailed information in the RFP. |
| II. Project Management Organization and Responsibilities | The major stakeholders and their roles and responsibilities should be identified here. A project organization chart should show the major reporting relationships and responsibilities. The Project management approach and the responsibilities of the vendor and the City for elements such as project planning, status reporting, change management, quality management and risk management should be described. |
| III. Key Assumptions and Constraints | Key project assumptions and constraints must be documented. Assumptions or constraints may relate to availability of resources such as funding, staffing, space, technology or equipment. Also, any known financial, legal, time deadline, technical and political constraints should be identified. |
| IV. Statement of Work | <p>A precise and complete Statement of Work is critical to successful vendor relationship. The statement of work in the contract is usually much more detailed than the statement of work in the RFP. The statement of work in the RFP is a general description of the work and is designed to attract the maximum number of qualified bidders. The contract statement of work, however, is written with a specific vendor in mind and documents the work required to implement the solution proposed by this vendor.</p> <p>This section provides an overview of the products and services to be provided by the contractor, the responsibilities of the contractor, of any sub-contractors and of the City. It should include a list and description of all major deliverables, in particular, those on which payments to the vendor will be based.</p> <p>The Statement of Work should also include a high level Work Breakdown Structure (WBS) identifying the major tasks together with Task Definition Statements as described in Chapter 5, Scope Definition. A Task Definition Statement template is provided in the Templates and Examples section of this methodology. Task definition statements are discussed in a little more detail later in this chapter and a condensed picture of the template is shown in Figure 20.1.</p> <p>The Statement of Work in the main body of the contract will usually be a high level summary and be supplemented by a more detailed Statement of Work as an attachment. The Statement of Work may reference sections of the vendor’s response to the RFP, but must include all changes or additional details that were determined in contract negotiations. For the more detailed tasks that are not subject to individual acceptance by the City, completion criteria rather than acceptance criteria should be defined on the Task Definition Statements.</p> |

Contract Administration

Components of the Statement of Work

The major components of a Statement of Work (SOW) are listed below. The document should specify the scope of work to be performed, the responsibilities of the vendor, the responsibilities of the City, the deliverables and the completion/acceptance criteria.

- A. **Project Summary:** A brief description of the project, the business need and its importance and priority.
- B. **Phase Description** (if applicable): A summary of the particular phase or phases that are the subject of the contract, and how they fit in the overall implementation strategy.
- C. **Deliverables:** A list and description of all major deliverables, in particular, those on which payments to the vendor will be based. Deliverables include:
 - the final working product or system,
 - individual components such as hardware and software,
 - documents such as requirements specifications, design specifications, test plans, test reports, user and technical manuals, etc. The description of documentation deliverables should include the audience, a generic table of contents and reference the documentation standards that must be followed.
 - training of users, technical support staff or internal trainers
 - project management deliverables such as the project charter, project plans and status reports
 - Any other services to be provided by the contractor

Acceptance criteria for each major deliverable should be provided. When applicable, detailed lists of hardware and software should be provided as an attachment.
- D. **Work Breakdown Structure:** A Work Breakdown Structure (WBS) as mentioned above and described in Chapter 5, Scope Definition, should be provided here. The level of detail must be sufficient to support the validation of reasonable resource loading in the Work Plan that is described below in Section V of the contract.

The WBS should encompass all project technical and management tasks, including:

- Requirements definition and/or fit analysis
- Design, including system design, business process design and design of all interfaces and data conversion processes
- Development
- Test, including unit test, system test and user acceptance test
- Infrastructure acquisition/installation
- Implementation, including:
 - Development of the implementation strategy/plan
 - Preparation of system and user documentation and organization procedures
 - Training of users and technical support staff
 - Data conversion
 - Documentation of security, backup and recovery procedures
 - Establishment of help desk or technical support

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- Post implementation support
- Project management tasks including planning, progress reporting, individual time reporting (if required), configuration control, change control, risk management and quality management

The WBS must include City tasks as well as vendor tasks. The supporting task definition statements should identify important task dependencies, particularly vendor dependencies on completion of City tasks and vice versa.

In a multi-phased project the WBS included in the contract may be detailed only for the current phase. The detailed WBS for following phase will then be a contract deliverable of the first phase.

- E. Task Definition Statements:** For every task or work package on the WBS there needs to be a Task Definition Statement as described in Chapter 5, Scope Definition. A template is included in the Templates section of the methodology. A condensed picture of the template is shown in Figure 20-1 below. Task Definition Statements may be part of the Statement of Work in the body of the contract, or in a more detailed breakdown of the work in an attachment.

Figure 20-1 Task Definition Statement

<u>Project/Phase Name</u>	<u>Task Name</u>	<u>WBS #</u>
<u>Task Description</u> (What is to be done)		
<u>Approach</u> (Key assumptions and how it will be done)		
<u>Deliverables</u> (list and brief description of the tangible outputs of the task)		
<u>Roles & Responsibilities</u> (if multiple organizations are involved)		
<u>Completion/Acceptance Criteria</u> (How will we know when task is complete? Who will sign off or approve? What is basis, including tolerances, for approval?)		
<u>Prerequisites</u> (dependencies on other tasks, deliverables, infrastructure, resources)		

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V. Work Plan

The Work Plan defines the schedule and resources required to complete the tasks described in the Statement of Work. The main body of the contract should contain a master schedule with delivery dates for the major deliverables and dates for all major decision points such as, approval of design before proceeding with development. The master schedule should be supplemented by more details in an attachment.

In some cases the work plan is the task plan proposed by the contractor in the response to the RFP with any modifications made during contract negotiations. Sometimes the detailed work plan is not available when the contract is being developed. Instead it is the first deliverable to be provided by the contractor by a specified due date.

In either case the Work Plan should be:

- Consistent with the WBS in the Statement of Work
- Include a Gantt chart or equivalent to document the schedule
- Identify significant task dependencies
- Include estimated vendor and City resource requirements by major task, and summarize estimated resource utilization to facilitate reasonableness checking

The schedule and resource plan should be in enough detail so that resource loading is clear and progress is measurable in weekly and monthly increments. The level of detail is also dependent on the phase of the project and the precision of the requirements. The short-term, next three to six months, schedule may be in more detail than the total project schedule.

The schedule should show milestones for all major deliverables and distinguish clearly between tasks for which the vendor is responsible and those for which the City is responsible, with dependencies between them. For example, the vendor task of delivering a draft report should be separate from the City task of reviewing and approving the report. The schedule should include adequate time for City staffing and procurement processes.

The work plan should include estimated hours for tasks to a reasonable level of detail that can be used for measuring progress based on earned value. Chapter 16, Schedule Control, includes a discussion of earned value as a generally accepted way of summarizing project progress.

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VI. Functional and Technical Requ'ts

The clarity, level of detail and accuracy of the requirements have a major impact on the establishment of a successful vendor relationship. The contract should refer to the functional and technical requirements in the RFP, plus any deviations or modifications in the vendor proposal. Specific changes made during contract negotiations should be documented here or in a referenced attachment.

Disagreements over functional requirements, whether or not they were covered in the contract or are new requirements requiring a contract change request, are inevitable and can easily become the cause of an adversarial relationship with a vendor. When detailed requirements are not known, it may be helpful to size the requirements by defining limits such as a maximum number of reports or a maximum number of online transactions, with some qualitative information to describe complexity.

If a contract is negotiated before detailed requirements have been defined, the Project Manager should provide flexibility in the contract to accommodate:

- scope negotiations during the requirements phase, using formal change control with appropriate management approval,
- re-negotiation of price, if necessary, at the end of the requirements phase and perhaps even the design phase.

Technical requirements include technical performance specifications, technical standards that must be met for the project to fit properly in the City's IT infrastructure, and systems development and documentation standards necessary for maintainability of the system. The main body of the contract may reference detailed specifications and standards that are in attachments.

Testing requirements should be included in this section, encompassing the categories of tests to be performed and the associated responsibilities. For example, systems integration test may be the prime responsibility of the contractor but will likely require City approval of the test plan. User acceptance test may be the prime responsibility of either the City or the vendor, but will require approval of the test plan and support of the actual test process by the other party. Requirements and responsibilities for recording and reporting test results should also be identified.

VII. Price and Payment Provisions

This section documents the price and payment terms and conditions for the contract. It should include a definition of any contract performance incentives, a payment schedule tied to deliverables and, usually, a holdback of 10 % of all payments until the final product of the contract is delivered and accepted by the City. Additional details should be documented on applicability of sales tax and on payments for third party hardware and software license and maintenance agreements.

Special consideration must be given to payment terms and particularly the payment schedule when the vendor is a small business that is not able to carry a large receivables balance.

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VIII. Contract Terms and Conditions

Contract Terms and Conditions can be divided into two classes, those that are unique to the contract and standard City terms and conditions. The former will be discussed below. The latest version of the standard City terms and conditions should be obtained from the department contract administration staff, if any, or from the City Attorney's Office.

Some of the details to be addressed in the contract terms and conditions are:

- a) DOCUMENTATION STANDARDS
 - Development and documentation standards (if not already covered in technical requirements)
 - Number of Copies of Deliverables
 - Documentation Media
- b) HARDWARE & SOFTWARE PROCUREMENT
 - Responsibility for purchasing or leasing the hardware and software?
 - Options, if applicable, to purchase additional hardware and software, for example, additional modules of a software package
 - Responsibility for maintenance agreements
- c) DELIVERY AND INSTALLATION OF HARDWARE AND SOFTWARE
 - Definition of delivery for payment purposes
 - Definition of completion of installation, including testing, for payment purposes
 - Definition of release level or version of all system software, for example, latest release at the time hardware is installed or system is implemented, or a specific release/version number.
 - Responsibility for physical loss, damage to, or destruction of the system hardware, software, materials and supplies before delivery and acceptance, and during the project
 - Prevention of software damage or destruction
- d) DELIVERY AND ACCEPTANCE/REJECTION OF DELIVERABLES
 - Delivery instructions for all deliverables, to whom, where
 - Proof of delivery requirements such as, signed receipt from City recipient or proof of mailing
 - Procedure and time limits for reviewing deliverables, accepting them or rejecting them for good cause, etc.
 - Procedure for initial handling of disagreements on acceptability of deliverables. Refer to later section on handling of disputes if agreement cannot be reached at this level.

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e) OWNERSHIP OF HARDWARE AND SOFTWARE

- Ownership of hardware during the project and after implementation (may be the same or may change)
- Ownership of software, both source and object code.
- Potential requirement that the vendor put vendor-owned source code in escrow with a third party, to protect the City's access to the source code in the unlikely event of a vendor bankruptcy.
- Rights of the City to modify source code, and resulting impact on any warranties or maintenance agreements
- Rights of the City or the vendor to sell or license custom developed code to third parties
- Rights of the City to utilize software acquired under this contract on other City projects or in other City departments or locations
- Ownership and lease responsibilities for 3rd party software components of the system ?
- Rights of the City related to 3rd party software
- Rights of the City to assign ownership or leases to others, if applicable

f) WARRANTIES AND MAINTENANCE

- Warranty period
- Scope of the warranty: usually it should cover the complete integrated system, not just the custom software component thereof
- Responsibility for obtaining warranty and maintenance services for third-party hardware and software
- The process for reporting problems and requesting warranty and maintenance services
- A service level agreement for warranty and maintenance services
- The price and terms of onsite support, if applicable
- Price and terms of a maintenance agreement after the warranty expires. It is sometimes desirable to negotiate this up front, when the City has a stronger negotiating position. It may avoid unpleasant surprises later

g) CONFIDENTIALITY

- An agreement for non-disclosure of confidential information by both parties

h) QUALITY ASSURANCE

- If the City intends to have an independent Quality Assurance/Audit function to review the project and the vendor's performance, whether City staff or contractor, this should be stated in the contract and, if necessary, the contract price should cover related vendor costs.

i) KEY PERSONNEL

- The contract needs to include a list of key vendor staff from the proposal and a process for City approval of any replacement of this key staff. The process must recognize conditions outside the vendor's control, such as, the resignation of a vendor employee.

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j) AUTHORIZED REPRESENTATIVES

- Authorized representatives of both parties for communicating commitments and decisions between them must be identified. On the City side it is usually the City Project Manager. Without this defined in the contract, anyone on the City staff may make an unauthorized City commitment to the vendor, for example, accept a deliverable that does not meet the City requirements.

k) STANDARD CITY TERMS AND CONDITIONS

These should be obtained from the Department Contract Administration staff or from the City Attorney's Office. An example is in the templates and examples section of this methodology. An explanation of the City standard terms and conditions is outside the scope of this chapter. However, some of the topics are listed below:

- Communications and Notices (Official Addresses)
- Financial Reports and Statements
- Non-interference with the City and its departments
- Excusable delays of performance
- Changes, deletions or additions to agreement (Change request/order procedure), including limits to the City's total obligation under this agreement
- Disputes
- Termination rights and termination costs
- Liability indemnification and limits
- Insurance requirements
- Right to retain consultants
- Incorporation of Exhibits
- Definitions of City and Vendor
- Order of precedence of exhibits (Contract, contract attachments, RFP, Vendor response, etc.)
- Compliance with laws and City ordinances

Pre-award Checklist

Before the contract is officially awarded, the project team should carefully reexamine all the major issues in the contract and ensure mutual understanding between the City and the prospective vendor. The following is a checklist for the project team to go through before the contract is awarded:

1. Are the key assumptions and constraints documented clearly?
2. Are all major or critical deliverables listed with acceptance criteria?
3. Is the WBS in the Statement of Work complete, including both vendor and City responsibilities and tasks?
4. Do task definition statements describe the tasks on the WBS adequately and contain task completion criteria?
5. Are the project schedule and resource estimates reasonable? Is the risk of exceeding the estimates acceptable?
6. Are functional and technical requirements defined in enough detail? Are all documents that contain the requirements referenced properly including an order of precedence?

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7. Is there adequate pricing and scope re-negotiation flexibility consistent with the level of detail of the requirements? Have adequate contingency reserves been established consistent with the perceived project risk?
8. Are billing and payment procedures documented? Has a percentage holdback until completion of the contract been included?
9. Is there a need for the vendor to submit time sheets, for example for incentive, cost, and time and materials contracts?
10. Does the contract contain project performance or system performance incentives, and if not, would it be desirable to add them?
11. Have hardware and software procurement and ownership been addressed, including:
12. Rights of the City to modify source code
13. Rights of the City and the vendor to sell or license custom developed code to third parties
14. Requirement for the vendor to put source code in escrow when the vendor delivers only run-time modules to the City
15. Rights of the City related to 3rd party software provided by the vendor?
16. Are all warranties in place, including the complete integrated system and all 3rd party hardware and software?
17. Is there a need to include a system maintenance agreement that follows the expiration of the warranty?
18. Have all necessary background checks been done?
19. Does the contract protect the City from replacement of key vendor personnel without the City's concurrence?
20. Have authorized City and vendor representatives been identified?
21. Have the latest City standard terms and conditions been included?
22. Does the vendor have any possible conflicts with other work that could impact this project?
23. Does the City committed adequate staffing and other resources to meet the City's responsibilities under the contract?

Monitoring and Controlling Contract Progress

In general, the tools for monitoring contract progress are the same as the tools for monitoring project progress described in Chapters 14 through 19. However, since the work is being done by a vendor under a contract, the monitoring and control at the contract level must be formal, with well defined plans, deliverables and status reports.

The most important factors in successful monitoring of progress on a contract are:

A project work plan in enough detail with significant tangible deliverables on a monthly or quarterly basis

Weekly project status review meetings with issues and action item logs

Clearly defined completion and acceptance criteria for tasks and deliverables

Functional and technical reviews of deliverables to ensure they satisfy the completion and acceptance criteria

Regular project status reports by the vendor following the model in Chapter 20 of this methodology.

Contract Administration

Evaluating Vendor Performance

Monitoring and controlling efforts should focus on the following two areas:

- keeping track of schedule performance and, if possible, getting some idea of whether the vendor is completing tasks within the vendor's hours and cost estimates. As the schedule slips and/or cost estimates are exceeded the vendor's profits are squeezed and there is a danger that the vendor will start to cut corners at the expense of quality.
- maintaining tight change control, and not allowing either City staff or the vendor to change the requirements or design without proper approval.

Evaluating vendor performance and providing regular feedback to the vendor are an important aspect of contract monitoring and control. Furthermore, the information is extremely valuable if and when the vendor bids on another City project. Meaningful vendor evaluation requires that the performance criteria be agreed upon at the start of the project. Major performance evaluation factors that are the basis of contract performance incentives must be documented in the contract. If the vendor does not understand the City's expectations and priorities up front the vendor is unlikely to meet the expectations, resulting in surprises, disappointments and friction.

Some typical performance evaluation factors for systems integration contractors are listed below:

- Schedule performance against the baseline schedule
- Actual quality of deliverables compared to the acceptance criteria
- Technical proficiency of the project team versus expectations based on the vendor's proposal response
- Openness and timeliness of communication with the City Project Manager and project team
- Project management effectiveness encompassing planning, reporting, scope management, quality management and risk management
- Customer service, i.e. performance related to anticipating the City's needs, helping in emergencies, negotiating differences in contract interpretation in good faith and with reasonable flexibility, meeting commitments, etc.
- Accounting accuracy and timeliness, e.g. accuracy of invoices and timeliness of credit memos.

A generally accepted approach to vendor evaluation is called the "Categorical Method". This method assigns qualitative performance ratings to performance categories such as those described above. . The rating scale should be simple, using terms such as "outstanding", "satisfactory", "marginal", and "unsatisfactory". Behind each category should be a list of factors and characteristics that contribute to the performance rating. Definitions of each grade should be documented ahead of time. Project team members should rate the vendor in the aspects with which they are familiar. The project manager then can combine the ratings from various sources and come up with the overall evaluation. To limit the amount of extra work involved, this evaluation should be done at most quarterly or at the end of a project phase.

Contract Administration

Achieving High Performance

Rewards

Providing feedback is a key element of motivation. To effectively motivate a vendor, the project manager must provide clear feedback to the vendor on regular basis. Feedback should be prompt so that the information is still relevant and can give the vendor an opportunity to take corrective actions.

Rewards should be planned as early as possible. An evaluation and reward plan should be part of the procurement plan. Rewards are of two types. Financial incentives and conditions are typically part of the contract. These incentives may be based on meeting or beating the scheduled due dates for critical milestones, sharing of cost savings, bonus for quality and superior technology.

Although financial incentives are the most common, there are other forms of rewards that may be equally effective. Certification that may give a vendor priority in the competition for future projects, prompt payments that will give the vendor better cash flow and save them significant administrative costs, and appreciation that may be expressed either in writing or verbally are all examples of non-financial rewards that the project manager can use.

Probably the best reward a vendor can get is the next contract. Past performance of a vendor is always an important factor in vendor selection. Unfortunately, there is little systematic evaluation of vendor performance currently being conducted. Most performance information, therefore, is based on personal observations. If a formal evaluation system is used, the project manager can emphasize to the vendor that the records will be kept for future reference when the City selects vendors for other projects.

Punishments

Similar to rewards, punishments for poor performance should be planned early, too. The contract should clearly stipulate the penalties for various performance problems such as late delivery, not meeting the technical requirements, etc. The conditions for the penalties should be clear, precise and measurable. The specific reasons for penalties should be documented.

The project manager should keep in mind that the purpose of punishment is to improve vendor performance in the future. Therefore, the project manager should always provide incentives for the vendor to correct the mistakes and devote extra effort to compensate for the damages caused by their poor performance. It is usually less expensive to let the same vendor correct the mistakes than to find a new vendor.

Resolving Disputes

In contract administration, disagreements are inevitable and are often related to different interpretation of contract details. The goal of the Project Manager is to resolve disagreements before they become major contractual disputes. To resolve disagreements and disputes successfully, the project manager needs to have good negotiation and communication skills as well as sound understanding of the technical nature of the issue in dispute. These skills can only be obtained and improved gradually by learning from theories and real life cases, and by accumulating one's own experience. As mentioned earlier, the contract terms and conditions should include the standard City processes for resolving major contractual disputes if they cannot be resolved by negotiations between the Project Manager and the vendor management.

Contract Administration

Major Tasks

The major tasks in resolving disagreements before they become disputes include the following:

1. Re-examine the true needs and priorities of both parties. The project manager must have a thorough understanding of the City's needs and priorities related to the dispute, and thorough understanding of the vendor's needs, priorities and capabilities. Good understanding will ensure that both parties will not waste their time on the issues that are not critical to the success of the project.
2. Communicate with the vendor. Some of the disputes are caused by misunderstanding. Some originally trivial disputes may develop into serious disputes because of misunderstanding. Even disputes caused by the calculated moves on the vendor's part may represent lack of understanding of the City's priorities. In these cases, improved communication will help resolve or even eliminate the dispute.
3. Negotiate a solution. It is beneficial for both parties to seek a win-win solution to the dispute. Win-win solutions are not always easy to find. Both parties must work hard to develop innovative ideas, and both parties should study not only the dispute itself, but also the context of the problem. Many innovative solutions are "packaged deals". New or different technologies may make a win-win solution possible in a difficult situation. Hard bargaining should be reserved as the last resort. Even in situations where hard bargaining seems inevitable, it is important that the parties involved do not jump into hard bargaining too early.
4. Document the solution. After a mutually acceptable solution has been reached, it should be documented in writing. If there is any change to the contract, the project manager should review the change procedures in the contract and carefully examine the impact of the proposed change on other parts of the contract.

The ideal solution to a dispute is to prevent it from happening. Good understanding, thorough communication, and effort to ensure clarity in the contract are all examples of ways to minimize disputes. Disputes cause interruptions in a project. Resolving disputes is time consuming and potentially damaging to the vendor relationship. Disputes are costly, and they distract people from the essential work of the project. If all the costs of disputes are considered, the additional effort to prevent disputes is well justified.

Contract Administration

Guidelines for Interpreting the Contract

Many disputes involve different interpretations of the contract. The following guidelines are adopted from *Restatement of the Law of Contracts*, which is a document published by the American Law Institute (ALI). The basic rules established in this document are widely used by courts and the boards of contract of appeal to interpret specifications of contracts.

- **Primary Rules.** *Restatement* §235 sets out the following primary rules for contract interpretation:

1. Technical words and terms of art are given their technical meanings, unless the applicable context or usage indicates a different meaning.
2. Writing is interpreted as a whole with all writings forming a part of the same contract interpreted together - it is not proper to interpret single words, phrases, or sentences out of the context.
3. All circumstances that accompany contract formation may be taken into account, except for oral statements by the authors regarding what the writing was intended to mean.
4. If the contracting parties demonstrate through their conduct a mutual, particular interpretation of specification after contract formation, that is the meaning to be used to interpret the specification.

If, after applying the primary rules, the meaning of the specification or other contractual language remains uncertain, *Restatement* §236 provides the following secondary rules.

- **Secondary Rules:**

1. An interpretation that gives reasonable and effective meaning to all the language in the contract is preferred to one that leaves part of the language unreasonable or that fails to give effect to part of the language.
2. The principal, apparent purpose of the contract is given great weight in determining the meaning to be given to a specification or any other part of the contract.
3. Where there is inconsistency between general provisions and specific provisions, the specific provisions are ordinarily held to qualify the meaning of the general provisions.
4. Where the terms of the contract are subject to more than one reasonable interpretation, they are construed against the drafter of the language. (This is particularly important since in IT contracts, the City is usually the drafter of the specifications and is therefore in the most exposed position.)
5. If written provisions are inconsistent with printed provisions, the written provisions are normally given precedence over the printed material.

If there is a substantial possibility of a legal action emerging from the dispute, the project manager should always report the issue to higher authorities and consult the City Attorney's office for advice.

Change and Issue Management

Change and Issue Management Overview

This chapter discusses two processes that significantly affect the chances of project success. They are:

- Issue Management
- Change Management

The management approach and responsibilities for these areas should be defined in the Project Charter during Project Initiation. At the start of project performance, these processes should be in place and working. Issue management and change management have been combined in one chapter because the processes are highly inter-related and similar. At times, a requestor may not be sure if an item is a change or an issue. Such an item will often be treated initially as an issue and end up in the change process.

Issues

Issues arise in the form of questions, problems, or suggestions raised by the project team, management, or contractor. Examples of issues are:

- An unclear requirement that needs clarification;
- A management decision that, if not made quickly, will delay certain tasks;
- A staffing shortage that, if not resolved, will require changes to the project plan;
- A new or missed requirement that needs to be evaluated to determine whether or not a change request is needed.

Timely resolution of issues is essential to keeping a project on schedule and within budget. Resolution of an issue usually requires the assignment of one or more action items. Each action item should have a responsible person and a due date clearly identified.

Changes

A Change, as indicated in its name, changes the scope, specifications, schedule or cost of a project. A change is usually initiated as a Change Request, evaluated for need and for impact on the project, and approved or rejected by the appropriate authorities.

An Issue can become a Change under two conditions:

1. The resolution of the issue requires a change in requirements or design, i.e. a change in project scope;
2. The unplanned analytical or other work required to recommend a solution is significant enough to have a schedule or cost impact on the project, regardless of the final resolution. In this case the additional work and its impact on the project should be documented and processed as a Change Request.

Issue management and change management will be addressed in that order in this chapter.

Change and Issue Management

What is Issue Management?

Issue management is a process to raise, review and track the resolution of issues. Issues that develop during the project need a way to be raised by the project team, and for the team to know that they will be addressed in a disciplined and timely manner in order to maintain the quality of the deliverable, as well as to control schedules and cost. The issue resolution process ensures that the differences, questions, and unplanned requests are defined properly, escalated for management attention, and resolved quickly and efficiently.

The Issue Management Process

The Issue Management Process should be designed to handle all kinds of issues including technical, business, management and operational issues. The process consists of the following steps:

1. The requestor describes the issue and its potential impact on the project on an Issue Resolution form such as Figure 21.1. The requestor may also recommend a resolution of the issue.
2. The project manager or his/her designee reviews the issue to determine: whether or not it is a real issue; its priority; whether or not it needs to be treated as a change request; to whom to assign the responsibility for its resolution; and the level of management that needs to be involved in the resolution.
3. The project manager assigns action items to the selected individual(s) with target completion dates. The assignments are documented on the Issue Resolution form and added to an Issue/Action Item Log such as Figure 21.2.
4. The status of all issues is monitored on the Issue/Action Item log that is maintained by the project management staff. The action item log should be reviewed regularly at project status meetings. If action items are not being completed in a timely manner the project manager should escalate the problem to the appropriate management, whether the Project Executive Steering Committee or the department/bureau/division manager to whom the actionee reports.
5. When the issue is resolved the resolution should be summarized on the Issue Resolution form, with references to any documents that contain more details of the analysis and the resolution.

The Issue Resolution Form

The Issue Resolution Form in Figure 21.1 gives everyone involved with, or affected by, the project a way to report issues or problems. It provides a template for documenting the problem, assessing the impact of the problem, making recommendations, determining the resources, cost and time required to resolve the problem.

Change and Issue Management

The form has four sections:

- The originator's section in which the originator describes the issue and recommends an action to resolve the issue;
- The reviewer's section in which the reviewer, who may be the project manager, assesses the priority of the issue, the resource commitment required to resolve it, and assigns responsibility and due dates for any required action items;
- The cost/schedule impact analysis section
- The resolution section in which closure of the issue is documented.

The form includes a classification of issues into categories that can facilitate the sorting of issues for review by different teams depending on the nature of the issue. The categories may need to be customized for each project, or may not be needed at all. A project team can also design its own form.

Change and Issue Management

Figure 21.1
ISSUE RESOLUTION FORM

Page 1 of 3

Project Name: _____ **Issue Control Number:** _____ (assigned by project mgmt. staff)

ORIGINATOR SECTION

Issue Title: _____	Date: _____		
Originator: _____	Organization: _____	Phone: _____	
Issue Type (check one):			
Request for Information: ____	Business Process: ____	Technical: ____	Project Management: ____
Other: ____ (specify) _____			

Description of the issue and of the potential impact on the project:

Recommended resolution or action to determine the resolution:

Date resolution needed: _____

Impact on the project if resolution is delayed:

Change and Issue Management

Figure 21.1
ISSUE RESOLUTION FORM

Page 2 of 3

Project Name: _____ **Issue Control Number:** _____

REVIEWER SECTION

Reviewer Name: (Project Manager or Designee) _____ **Organization:** _____ **Phone:** _____

Reviewer Recommendations: (Select one of the 4 actions below)

1. Resolved: ____ Check here, and see resolution on Resolution section of this form

2. Assign to: _____ for resolution **Due Date:** _____

3. Assign to: _____ for Cost/Sched. Impact Analysis **Due Date:** _____

4. Defer – Reason: _____

Reviewer Signature: _____

COST/SCHEDULE IMPACT ANALYSIS SECTION

Results of Cost/Schedule Impact Analysis (if applicable)

Estimate of Additional Effort:

Staff/Resource	Hours or Workdays	Cost:
_____	_____	_____
_____	_____	_____
_____	_____	_____

Elapsed Time Required: _ days

Impact on other tasks (dependencies, delays): _____

Change and Issue Management

Figure 21.1
ISSUE RESOLUTION FORM

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Project Name: _____ Issue Control Number: _____

RESOLUTION SECTION

Resolution documented by: _____	Phone: _____	Date: _____
Summary of Resolution: (answer to the question, decision, etc. If necessary, refer to a document containing details.)		
Change Request Required: _____ (Check if above resolution is a change in project scope, schedule or cost)		
Change Request Assigned to: _____		Due Date: _____
Change Request Number: _____		
Approved By: _____	Project Manager	
Signature: _____	Date: _____	

ITA Project Management Support Office
Revised Date: 8/22/00

Issue/Action Item Log

Figure 21-2 is an example of an issues/action items log for tracking the resolution of issues. Timely resolution of issues is critical to a project staying on schedule. The form can also be used to track action items that are assigned in project team meetings that are not necessarily documented on an Issue Resolution form. However, if a task is on the project plan it should not be duplicated as an action item on this form.

Change and Issue Management

Figure 21.2 ISSUE/ACTION ITEM LOG EXAMPLE

<u>Project:</u>		<u>Updated By</u> <u>Phone:</u>			<u>Date Updated:</u>		
<u>Issue/ Action No.</u>	<u>Issue/Action</u>	<u>Assigned To</u>	<u>Date Opened</u>	<u>Due Date</u>	<u>Revised Due Date</u>	<u>Date Closed</u>	<u>Comments</u>

ITA Project Management Support Office
Revised Date: 7/5/2000

Note: The Templates section of the methodology contains a landscape version of this form that is more suitable for downloading and use.

Change Management Overview

Change management is the process of proposing, evaluating, approving or disapproving, and managing changes to a project. Changes will occur and will affect the scope, cost, quality, and nature of the project deliverables, as well as the functioning of the project team. The change management process is needed in order to maintain the balance between requirements and the cost/schedule. This process allows for change during the project's life cycle but always puts the change in the context of the latest documented agreement (project plan) between the team and management and, in the case of the contractors, the contract.

Uncontrolled scope creep or change in a project is one of the major reasons projects fail or exceed schedule and cost targets. Moreover, this is an area in which project managers and teams can easily lose control. The reason is typically a lack of discipline within the project team and with the customer to resist "changing" the stated product of the project. A solution is to establish a critical baseline of the project's products and to document it. These documents include the Project Charter, the Scope Statement, the Work Breakdown Structure, the Project Plan, the Requirements Specification, the Design product specification, and other

Change and Issue Management

The Change Management Process

development documents, that are placed under Change Control. Whenever a question is raised, the baseline documents are always the reference point. Anything that is not covered in the baseline or that alters the baseline is a change.

The key elements of Change Management are:

- A central repository for the baseline documents and all change information
- Identification of the team member(s) who will be responsible for maintaining the baseline documents and tracking all changes thereto. The project manager may perform this function personally or assign the responsibility to a member of the project management staff. In the discussion below the assigned person is referred to as the “Change Manager”.
- Establishment of a Change Control Board

The Change Control Board should consist of the Project Manager, the Change Manager (if different from the Project Manager), key technical and management staff from the project team, representation from executive management, stakeholders, and user communities. The size of the Board should be kept to a working group of, preferably, not more than 10 people.

- Continuing evaluation of issues and changes and development of appropriate resolution/implementation strategies.
- Inclusion of change summary information as part of the standard project status meetings and Executive Steering Committee meetings.

The Change Management process is very similar to the Issue Management process. The Change Request form in Figure 21.3 is similar to the Issue Resolution form. It consists of four sections, a requestor section, an initial review section, a cost/schedule impact analysis section, and a final approvals section. Anyone within the project team, user community, stakeholders, or contractors can submit a change request. This is to be done in writing either on paper or in automated format.

The process consists of the following steps:

1. *Requestor initiates the Change Request*

The requestor fills out the first section of the Change Request form, describing the proposed change and the justification for it. The request also includes the impact on the project, if any, of not making the change, and a discussion of other possible alternatives.

2. *Initial Review of the Change Request*

The Project Manager or designee will review the initial request and determine whether to proceed, reject, or defer the request. In moving forward, the request will be assigned to an analyst for an initial impact analysis.

Change and Issue Management

3. *Initial Impact Analysis*

The assigned analyst will make an initial assessment of the cost, schedule, and resources needed to implement the proposed change. If the requested change is complex, and an initial assessment cannot be made within two days, a formal Cost/Schedule Impact Analysis (CSIA) should be requested. The analyst will indicate this and will estimate the cost, schedule, and resources needed to perform the CSIA.

4. *Initial Change Control Board Review*

The Change Control Board reviews the results of the preliminary cost/schedule impact analysis and the recommendation of the Change Manager and either:

- a) Approves the change request
- b) Rejects or defers the change
- c) Authorizes a formal Cost/Schedule Impact Analysis

5. *Formal Cost/Schedule Impact Analysis* (if applicable)

The assigned analysis(s) performs a complete cost/schedule impact analysis, including the impact of not making the change or any recommended alternatives.

6. *Final Change Control Board Review* (if applicable)

The Change Control Board will once again review the requested change and either approve, reject, or defer the change.

7. *Project Executive Steering Committee Review* when required according to limits established in the project charter.

The Change Request form is additive. In other words, additional information is completed on the form as it moves through the process. An example is shown in Figure 21.3.

Change and Issue Management

Figure 21.3
CHANGE REQUEST FORM

Page 1 of 3

Project: _____

Change Request Number: _____

REQUESTOR SECTION

Change Request Title: _____		Date _____	Initiated: _____
Originator: _____	Organization: _____	Phone: _____	
Change Type (Check one):			
Requirements: _____	Design: _____	Other: _____ (specify) _____	

Proposed Change Summary Description: (Include references to documents containing the details)

Justification: (e.g. new City ordinance, missed mandatory requirement, reliability improvement, cost savings)

Impact of Not Implementing Proposed Change: (e.g. potential legal liability, more manual effort and costs)

Alternatives: (e.g. different equipment or software, manual workaround)

Date decision on change is required: _____

Reason (impact on the project if decision is delayed)

When this section has been completed, it should be submitted to the Project Manager or the designated Change Manager. At that time, a Change Request number will be assigned so that the change request can be tracked to completion on the Change Request Log (Figure 21.4).

Change and Issue Management

Figure 21.3
CHANGE REQUEST FORM

Page 2 of

3

Project: _____

Change Request No: _____

INITIAL REVIEW SECTION

Date Review Completed: _____

Reviewer Name: _____ Organization: _____ Phone: _____

Preliminary Impact Analysis: (which deliverables and tasks are impacted by the change, and magnitude)

Preliminary Schedule and Cost Impact: (Can be a range)

Detailed Cost / Schedule Impact Analysis (CSIA) Required? Yes ___ No ___
(based on limits set in the project charter)

If yes, estimated resources, cost and schedule for the CSIA

RECOMMENDATION: Check one

Approve for implementation: _____ and Priority: High ___ Med. ___ Low ___

Proceed with CSIA: _____ Defer: _____ Reject: _____

Reasons for deferral or rejection:

Reviewer Signature: _____

Change Control Board Initial Review:

Date: _____

Approve for implementation: _____ and Priority: High ___ Med. ___ Low ___

Proceed with CSIA: _____ Defer: _____ Reject: _____

Reasons for deferral or rejection:

Project Manager Signature: _____

Change and Issue Management

Figure 21.3
CHANGE REQUEST FORM

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3

Project: _____ Change Request No: _____

COST/SCHEDULE IMPACT ANALYSIS SECTION (If CSIA is required) **Date:** _____

Analyst Name: _____ **Organization:** _____ **Phone:** _____

Impact Analysis: (which deliverables and tasks are impacted by the change, and magnitude)

Resource Requirements, Schedule, Costs and Benefits:

Analysis of Alternatives: (Impact, schedule, cost, benefits)

RECOMMENDATION: Select one

Approve for implementation: _____ **and Priority:** High _____ Med. _____ Low _____

Implement Alternative # _____ **and Priority:** High _____ Med. _____ Low _____

Defer: _____ **Reject:** _____

Reasons for deferral or rejection:

Analyst Signature: _____

FINAL APPROVALS

Change Control Board: _____ **Date:** _____

Project Manager: _____ **Date:** _____

Project Executive Steering Committee: _____ **Date:** _____
(if required per project charter)

Change and Issue Management

***Final Review
Results and Change
Priority***

When the analysis has been completed by the assigned analyst, and the cost, schedule, and resource needs are identified, the management team will submit the change to executive management and/or project oversight agencies for approval and, if approved, prioritization. Sometimes making a decision on a Change Request or an Issue can be urgent because delaying a decision can have a significant schedule and/or cost impact. When this occurs it may be necessary to make the decision based on incomplete information. This increases risk because, if the guess was incorrect, work may have to be redone.

***Change Control
Board Schedule***

All change requests will be reviewed on a regular basis by the project Change Control Board. This Board will typically meet on a weekly, bi-weekly, or monthly basis. The actual schedule will depend on where the project team is in terms of the project life cycle. During phases that typically have a high volume of change, the Board might meet weekly. During other phases, the Board might meet once a month. The Change Manager will drive the schedule based on the number and complexity of change requests.

***Change Control
Log***

It's very important to track the status of all changes to ensure that the required decisions are made in a timely manner, and that team members know which changes have been approved, which have been rejected or deferred and which are still pending. An example of a Change Control Log is shown in Figure 21.4 below.

Figure 21.4 Change Control Log Example

<u>Project:</u>		<u>Updated By</u>					<u>Date Updated:</u>		
<u>Change Request No.</u>	<u>Name</u>	<u>Requestor</u>	<u>Date Initiated</u>	<u>Decision needed by Date</u>	<u>Initial Change Board Review Date</u>	<u>CSIA Compl. Date</u> (if req'd)	<u>Final Change Board Review Date</u>	<u>Mgmt. Approval Date</u>	<u>Disposition</u> Approved Deferred Rejected

ITA Project Management Support Office
Revised Date: 8/22/2000

Note: Download the landscape version of this form from the Templates and Examples section of the methodology.

Project Closing

Project Closing Overview

A successful closeout starts at the beginning of the project. It is at the beginning of the project that the objectives and the evaluation criteria of the project are first established. A successful closeout also requires that the project manager keep the project on the right course during the execution and control phases. Ineffective management of scope, cost and/or schedule during the execution and control phase, although it may not be obvious at the time, can cause serious problems in the closeout phase.

The process of closing a project is fairly routine. Arriving at the point where the buyer/user agrees that the project is complete and finished, however, is usually not so routine. Therefore, the success in closeout relies heavily on careful planning and sound management throughout the entire project.

This chapter discusses the following issues:

- Importance of planning ahead for project closeout
- Major tasks of project closeout
- Definition of project success
- Recognition of success
- Archiving project data and files
- Documenting successes and lessons learned
- Celebrating project completion

Major Tasks of Project Closing

Closeout is the last major phase of a project's lifecycle. A project cannot be closed out with a success unless the following are accomplished:

- The final product is complete and meets the goals and objectives of the project.
- The user has accepted the final product.
- The transition of system into operation has been completed and the system is successfully in use.
- There is adequate evidence that the system is reliable and maintainable.

The major tasks of project closeout are:

1. Closing all contracts, which is discussed in more detail in Chapter 20, Contract Administration
2. Closing all cost accounts after all lagging charges have been recorded

Project Closing

3. Writing a final project status report, which notifies all stakeholders that the project has been completed and is being closed, and lists any residual items and issues that will be handled as part of system operations and maintenance
4. Re-deploying project resources—staff, facilities, and equipment. Re-deployment can occur before the Closeout phase starts. The Project Manager must plan for the release and re-deployment of project resources so that resources can be transferred as soon as they are no longer needed by the project.
5. Completing and archiving project records
6. Documenting successes and issues of the project
7. Conducting a lessons learned session
8. Celebrating project completion

These tasks are particularly important for large-scale IT projects with extensive records and resources.

What is Success?

Success is defined at the early stages of planning the project. In this project management methodology, success factors are developed as part of project initiation. Although cost and schedule are always important considerations, success means more than just under budget and on schedule. In fact, many projects can be considered a tremendous success even though the project did ultimately cost more than what had been anticipated.

Some key questions that determine success are:

- Does the product satisfy all major user requirements?
- Does the performance of the product meet or exceed the original expectations?
- How does the actual operating cost compare with the forecasted operating cost?
- Do the end-users and other stakeholders view the project product positively?
- Was the project well managed?
- Did the team and the project stakeholders work well together?

User acceptance of the system is a critical and important prerequisite to project closeout. Acceptance should be based upon the project objectives

Project Closing

Recognition of Success

defined very early in the initial planning stage of the project. This acceptance should be formally documented. It is recommended in this methodology that the acceptance criteria be defined in the Project Charter and the Scope Statement. Any modification of the acceptance criteria should be treated as a major change to the project plan and should follow the recommended policies in the Change Management chapter.

There is fairly universal recognition that positive reinforcement, or rewarding behavior, is an effective management tool. When success in a project is achieved, the management should provide some recognition to the team. Although financial compensation is important, recognition, however, rewards an effort beyond the call of duty. Since it is a goal within the City to increase the number of successfully executed projects, recognition of the project teams that have met this goal shows the top management's emphasis on effective project management and will encourage other project teams to improve their performance in the future.

There are many ways to reward people for a job well done. Management may want to express recognition of a successful team effort by praising the team at a key meeting or a large gathering of staff. People are proud to have senior management appreciation stated, and such recognition sets the stage for future successful work. The reward might also be an informal after work gathering or a celebration lunch. If individuals are singled out for significant achievements, the management should not forget to recognize the entire team as well.

Archiving

Collecting Project Data

Following the acceptance of the product, the project database is archived. Historic project data are an important source of information to help improve future projects.

The specific information that is archived for a project will vary between City organizations. Typically, the following project documents and data are archived:

- Project plans
- Other project management documents:
 - Correspondence
 - Meeting minutes
 - Reports
 - Procurement documents such as RFP's, vendor proposals, contracts, change orders, etc.

Project Closing

- Technical documents:
 - Requirements
 - Design specifications
 - Test plans and reports
 - System documentation
 - Software documentation
- Files, programs, tools, etc. that had been placed under configuration management
- Other information that might be useful for future projects

All the hard copy records should be stored following the standard City record retention guidelines. Many of the technical records and automated versions will be turned over to City personnel responsible for maintenance and operation of the system. Summary technical information should be electronically stored for historical reference to facilitate later review. The project archive should include a description of the files being submitted, the application (including version) used to create the archived materials, and a point of contact if further information is needed.

The project management information collected includes information such as a description of the project, a project organization chart, budgeted and actual costs, and estimated and actual schedules. Assumptions associated with the project budget values and budget changes that were documented throughout the project are included in the archive.

Where is the Archive Maintained?

The Project Management Support Office of the Information Technology Agency maintains an archive of project summary information for the City's information technology projects. The more detailed information is archived at the sponsoring/main user organization. The archive at ITA is available online or by calling the Project Management Support Office.

How is the Archived Material Used?

Building a repository of past projects serves as both a reference source for estimating other efforts and as a training tool for City project managers.

Past performance data are usually the best source for estimating future work. Project archives can be used when estimating activity durations and costs, and in developing metrics on productivity of the development

Project Closing

Documenting the Successes and Lessons Learned of the Project

teams. When sufficient project data are collected over time, the City may be able to develop a knowledge base that will help make reliable estimates and develop realistic project plans.

Post Implementation Evaluation Report

A Post Implementation Evaluation Report (PIER) documents the successes and failures of the project. It provides a historical record of the planned and actual budgets and schedules. Other selected metrics on the project may also be collected depending on their potential value to other projects. In addition, the report should contain recommendations for similar projects.

The PIER should include information on:

- Overall review of the project and its final product
- Project organization
- Staffing and skills
- Financial data
- Schedules
- Successful techniques and processes used for project communication, risk assessment and mitigation, change control, quality management, etc.
- Lessons learned

The project manager typically has the responsibility of preparing the report. The project manager gets input from the entire project team, the users, and other major stakeholders. People performing different functions on the project will have a different outlook on the successes and failures and on possible solutions. If every project member cannot be consulted, the project manager should at least ensure that a representative from each major area of the project participates. The user's overall view of the project and its final product is also a major focus of the report. It is this view, along with the view of the major stakeholders that lives on after project closeout.

It is particularly important that the PIER identifies successes as well as problems of the project. The PIER must also document successful new ideas used in the project and make recommendations on how these ideas might be adapted for other projects.

Project Closing

Project successes should be shared with other projects and organizations in the City so they can be repeated. When appropriate, successes should be translated into procedures that will be followed by future projects.

Document Lessons Learned

In addition to communicating the closure of a project in writing, it is also advisable to have a mechanism for group review. A “lessons learned” session is a valuable closure and release mechanism for team members, regardless of the project's success. Table 22.1 lists typical categories of lessons learned and gives examples for each category. It should be noted that this is a general list for all large scale IT projects. It is possible that only a subset of the items listed in the table applies to a particular project.

Project Closing

Table 22.1 Documenting Lessons Learned - Categories and Examples

CATEGORIES	EXAMPLES
Project Management	
Organizational Effectiveness	<ul style="list-style-type: none"> - Effective ways to communicate with stakeholders - Ways to improve IT and User partnership - Roles and responsibilities of the project champion/sponsor - Effective strategy and approach to project manager selection - Effective team building and consensus building techniques
Project Initiation	<ul style="list-style-type: none"> - Ways to define and communicate the strategic goals of the project - Effective strategy and approach to develop the funding proposal and feasibility study report - Effective ways to improve accuracy of high level time and cost estimates - Effective ways to speed up the initiation process
Project Planning	<ul style="list-style-type: none"> - Effective ways to develop realistic schedules and budgets - Ways to identify and obtain resources needed for the project - Appropriate balance between the benefit of detailed plans and the cost of developing such plans - Effective ways to involve stakeholders in project planning and to obtain support for the project
Execution/Control	<ul style="list-style-type: none"> - Proven approaches to quality assurance - Effective approaches to meet the schedule and control costs - Effective vendor selection approaches - Ways to improve the procurement process - Incentive-based contracting mechanisms - Effective vendor management strategies and methods - Effective scope and change management systems
Closeout	<ul style="list-style-type: none"> - Checklist for a successful closeout - Documentation, archiving, and dissemination of project data and knowledge
Systems Development	
System Analysis	<ul style="list-style-type: none"> - Effective ways to define requirements that satisfy the user's needs and are within the scope of the project - Effective ways to promote cooperation between IT and user personnel - Successful methods for documenting business processes and the policies that govern these processes

Project Closing

System Design	<ul style="list-style-type: none"> - Strategies and methods that effectively integrate the processes of business process design and IT system design - Effective ways of using prototyping in design - An effective acceptance process that assures design quality - Effective technology selection strategies
Development/Implementation	<ul style="list-style-type: none"> - Effective implementation strategies - Effective ways to maintain partnership with the vendor - Testing approaches, plans and checklists - Effective conversion strategies - Proven documentation methods
Operation	<ul style="list-style-type: none"> - Effective ways to transfer knowledge and resources - Successful training methods and programs - Early involvement of the operations team in system development and implementation

Lessons Learned Session and Celebration of Project Completion

Documenting lessons learned is a major purpose of the PIER. This means that problems encountered by the project team must be openly presented. Identification of the problems in the completed projects helps eliminate their occurrence in future IT endeavors. It is not necessary to document every small thing that happened. Encountered problems should be prioritized with focus on the top five to ten problems. It is important, however, that discussions in the PIER do not merely point a finger away from the project team. Responsibility and ownership for problem areas are critical to developing useful recommendations for future projects.

Since problems or sensitive issues may be discussed in the PIER, it is helpful to include every organization identified as a contributor in a review of the report prior to formally submitting the document. It is useful to have the reviews in an interactive forum where all parties can discuss their recommendations for improvement. The PIER can then present a complete view of the project.

The lessons learned session is typically a large meeting that includes:

- Project team
- Stakeholder representation - including the external project oversight organizations
- Executive management
- Maintenance and operations staff

Project Closing

Such a session provides a forum for public praise and recognition. It also offers an opportunity to discuss ways to improve the project management processes and procedures.

Celebration of project completion provides an official closure to a project. It also provides an opportunity for formal public recognition. In addition, this celebration also means the beginning of new endeavors for most people involved in the completed project. A well-organized celebration may help carry the positive atmosphere into the next project.